EDITORIAL

The End of a Regrettable Contest

There are some reasons for placing this article in the 'Obituary' column, since it is concerned with the death of the architects' licensing bill, which was proposed at the recent session of the California legislature. Our readers are already somewhat familiar with some of the earlier forms of this much-amended measure. In our last issue we ventured to surmise that whatever further amendments were made to the bill, it would remain thoroughly objectionable. Events proved that we were correct, but the last bunch of amendments gave a result that was positively ludicrous. Nearly every special interest that was likely to be affected by the measure, hurried a representative to Sacramento and was duly placated with an amendment. The farmer, the oil operator, the speculative builder who once threw some building materials together and called it a bungalow, as well as many others, were in turn exempted in one way or another from the drastic provisions of the bill. Finally, the pitiful hybrid was led out of the committee-room on to the floor of the Assembly, where it was speedily put out of its misery.

The fight itself is over, but one unpleasant result remains with us. Engineers were arrayed against architects in the discussion of this measure. As a result, laymen and possibly some of the members of the two professions have received the impression that there are real causes for differences between engineers and architects. Reputable architects should not allow themselves again to be dragooned into supporting measures of this kind. The field of building construction is broad and there is room for both architects and engineers, without either profession attempting to make rules regarding the way the members of the other profession shall carry on their business.

Pacific Coast Highways and the Military Situation

There are some branches of construction in which activity may be lessened somewhat because of the need for capital for carrying on the War. This should not, however, apply to highway work, particularly on the Pacific Coast, since there is great need, for military purposes alone, of the construction of many additional highways, and the improvement of some of those now existing. In this connection, a report on military highways in California made to the War Department by Major-General J. F. Bell, and recently given to the public is of interest.

The report states that the highways requiring the most immediate attention from a military viewpoint are those in the general vicinity of the Coast line. These are classified further in order of importance as follows: highways between Carmel bay and Bodega bay, highways between Ventura and the Mexican border, highways in the vicinity of Humboldt bay, highways between Fort Bragg and Humboldt bay. Of these roads, the inland route between Carmel bay and San Francisco is in excellent condition, but that following the coast is not nearly so good. Between San Francisco and Bodega bay, the best route follows the State highway to San Anselmo and thence by a fair road to Bodega bay. Between Ventura and the Mexican border the road is nearly all concrete-paved State highway. The roads in the vicinity of Humboldt bay are most of them in poor condition, particularly in wet weather. The road along the coast from Bodega bay to Fort Bragg is in fair condition but there are many steep grades.

Next come the highways in the Eel River, Russian River, Santa Rosa, Santa Clara, and Salinas valleys, together with those in the hills east of San Diego and the laterals between the coast valleys and the central valleys of California. Of these, the roads in the Eel River valley are mainly poor, those in the Russian River and Santa Rosa valleys are good, while the concrete-paved State highway traverses the Santa Clara and Salinas valleys. Few of the highways east of San Diego are in even fair condition, and the laterals between the interior valley and the coast leave much to be desired.

Next in importance is placed the route of the State highway through the central valley, which is nearly all paved and will soon be entirely completed.

Fourth in order of importance are placed the highways crossing the Sierra Nevada mountains. The following points should be considered in this connection: duration of traffic-season each year; grades, which would undoubtedly be better in the canyons than if the ridges were followed; distance, which would probably, but not necessarily be less if the ridge-routes were chosen; and military importance of territory affected. Regarding the last consideration, the report states that the Feather River is to be preferred to the Pit River route, because it is more centrally situated.

In view of the foregoing, it would seem advisable that Federal, State, and county authorities take the necessary steps to remedy the defects in the present system of military highways as soon as practicable. In particular, careful consideration should be given to the question of providing a highway across the Sierra Nevada mountains that will be open during practically the entire year. The present routes are closed by snow for from five to seven months every year. The routes tentatively selected by

Generated on 2024-09-30 01:27 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

the State Highway Commission for the Alturas and Quincy laterals, while a great improvement in many ways, would be little better as far as extending the season for through-traffic across the mountains is concerned. It is true that these routes along the ridges would be considerably cheaper to construct than if the canyons were followed, but it should be remembered that the decision of the commission was made before the passage of the Federal Aid Road Act. Part, if not all, of the extra cost of following the canyons could undoubtedly be met by the Federal Government.

We believe that either the Pit River highway to Alturas or the Feather River highway to Quincy should be constructed along the canyons, so that the danger of the road being closed by snow may be a minimum. The Feather river provides the most direct route to central Nevada, Utah, and the East; while Pit river provides the most direct route to Oregon, Washington, Idaho, and northern Nevada. The advocates of both routes claim that the interruption from snow would be negligible in ordinary seasons, and comparatively slight in exceptionally hard winters.

Robbing Peter to Pay Paul

It is not unusual for economic subjects to be involved and difficult of interpretation; but there is one subject, at least, so plain and apparent on its face that anyone may read as he runs. That subject is the present condition of the petroleum market. The scarcity of petroleum and petroleum products is of world-wide extent; and, although it is perhaps not as alarming as the Government experts would have us believe, yet it is sufficiently alarming to be of grave concern. The supply of crude petroleum continues to decline notwithstanding advance after advance in the price offered by refiners and marketers, until at present Pennsylvania oil is commanding the highest price offered in this generation. Today, Mexico is the only spot on the face of the earth capable of producing more oil than the market is taking. This surplus, however, is practically unavailable because of the lack of sufficient tank-steamers to transport it. Charters which sold for $600 per day in 1914 are today unobtainable at $2000 per day. The cost of tank-steamers has increased from approximately $100 per barrel of carrying capacity in 1912 to $350 per barrel at the present time, with all of the ship-building capacity of the world contracted for a considerable time to come.

In California conditions are the same as in other parts of the world. In May, 1915, the total stocks of Californian oil above ground (both refining and fuel) amounted to approximately 60,800,000 barrels. At that time the price for fuel-oil was $0.325 per barrel. Stocks of crude oil began to decline at the rate of about 200,000 barrels per month, which increased to 500,000 barrels in September 1915, and by the beginning of 1916 had reached the alarming rate of 1,000,000 barrels per month. The price was advanced to $0.73 per barrel by the end of the year 1916. These advances resulted in increasing the average number of wells completed per month from 19 to 60, nevertheless, the draft on stocks continued. During 1916, stocks were reduced at the rate of more than 1,000,000 barrels per month, notwithstanding the efforts of the producers to increase their output. The advance in the price resulted in an increase of production of 32,000 barrels per day, but in the meantime the demand for oil had increased by 87,000 barrels per day, so that the decline in stocks continued. The first quarter of 1917 shows a decrease in stocks of 2,900,000 barrels. The condition of the fuel-oil supply, considered by itself, as it concerns us today is even more alarming than the general market-condition. There is above ground and available about 25,000,000 barrels of fuel-oil, with which the marketing companies have to meet contract obligations of approximately 100,000,000 barrels; or, in other words, there is now on hand a reserve supply of approximately 25%. The consumption of fuel-oil is approximately 8,000,000 barrels per month (total shipments less 1,000,000 barrels converted in refinery products), of which about 2,000,000 barrels is burned by the railroads and 6,000,000 by other industries. Is it surprising that the marketing companies are refusing new business and are even loath to take care of old consumers? Yet the Southern Pacific Company has been asked by the Government either to go into the market and buy 360,000 barrels of fuel-oil per month or to run the risk of disorganizing its service to the public. Were it possible to buy 360,000 barrels per month, the result would be simply to decrease by 6% the amount being used by other industries. Robbing Peter to pay Paul.

In the face of these facts, the Southern Pacific Company requested that it be allowed to increase the production of its own crude oil by drilling upon its own lands and at the same time agreed that the increased oil produced would be delivered to the Navy on demand should it be held that the Government has any right in or to the lands in question. This offer was made in the spirit of conservation since the only way known to oil-men to conserve oil in an area subject to heavy drainage from a large number of wells on adjacent property is to produce and store the oil.

On April 15, 1917, President Wilson proclaimed to the American people:

"To the men who run the railways of the country, whether they be managers or operative employees, let me say that the railways are the arteries of the nation's life, and that upon them rests the immense responsibility of seeing those arteries suffer no obstruction of any kind, no inefficiency or slackened power." * * *

"The manufacturer does not need to be told, I hope, that the nation looks to him to speed and perfect every process; and I want only to remind his employees that their service is absolutely indispensable and is counted on by every man who loves the country and its liberties."

Nevertheless, the Court has ruled that the Southern Pacific Company shall not be permitted to take this most obvious measure for the protection of the public and for the safety of the Nation.

Generated on 2024-09-30 01:23 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

REVIEW OF THE MONTH

WAR has been declared and the prophets of Preparedness, who have too long been as one crying in the wilderness, are now being heeded reverently. While many loyal citizens have been wondering in what way they can serve their country, for the engineer there is no such perplexity. For modern warfare, from the munition factory, the mine, and the farm, clear to the first line of trenches, is mainly a matter of engineering. In another column we print a description of the work of the Engineer Corps at the Front and in preserving the lines of communication. The number of trained engineer officers and enlisted men in our present army is so small that most of this work must be done by engineers who are now in civil life, and who have still to be given as much training as possible in the purely military side of such activities. Many other engineers will find their greatest usefulness to be in their present positions, either in manufacturing supplies, transportation, or even in highway construction, which may become of the greatest importance in facilitating the movement of troops from point to point.

ANOTHER aspect of war-preparedness is also of great importance to the engineer, namely, increase of output and elimination of waste of our resources, particularly food. It is entirely possible that the War may be brought to such a speedy conclusion that no members of the army we are now preparing to raise will have the opportunity to be under fire, but even if peace should come in a few months, the world will still have to go on short rations for several years to come. Agricultural experts have shown that while an actual famine is impossible in the United States, care will be needed to prevent the exhaustion of some kinds of foodstuffs. Furthermore, the more that is produced and the less that is wasted in America, the more supplies will be available for our Allies in Europe, who must continue to bear the brunt of the actual conflict until we can get an army ready to go to their assistance. Ridiculous as some of the back-yard and vacant-lot farmers may appear, they have the right spirit. The real increase of food supplies must, of course, come from the cultivation of hitherto waste lands and from more intensive methods for land now under crop. Unfortunately, in the arid and most of the semi-humid regions, it is now too late to put in a crop and obtain results without irrigation.

ECONOMY in the use of irrigating water by the holders of water-rights, would, however, release a considerable amount of water in most irrigated districts, and this could be used on land that cannot otherwise produce a crop. Even if the supply of surplus water is so uncertain that nothing but wild grasses can be produced, that will at least provide pasture, and help in the solution of the meat-supply question, admittedly the most serious problem. The attainment of maximum production of any crop, however, is more dependent on an assured labor-supply even than on an assured water-supply. We may yet have universal service in the harvest-fields to complement universal service in the fighting forces.

DISTRIBUTION of supplies is also a matter of the utmost importance, and one where our ordinary peace-methods have been particularly faulty. The country is fortunate indeed to obtain the services of such an eminent engineer and administrator as Mr. Herbert C. Hoover, to handle the entire matter of food distribution. What means will be required to check speculation, and insure sufficient food to even the poorest, remains to be determined. Probably the fixing of a minimum price for a commodity high enough to insure a reasonable return to the producer and a maximum price low enough to prevent exorbitant profits will be more effective than setting a single price. Hoarding of a large quantity of any kind of food will be easy to stop once the country in general gets used to the necessity of having its liberties abridged somewhat in time of war.

PETROLEUM and its products are Pacific Coast commodities that are of importance in a war. During the past three months, shipments of Californian oil have exceeded production at the rate of approximately 50,000 barrels per day. In spite of the fact that 360 wells are now being drilled, the production of the new wells is just about enough to compensate for the decline in production of old wells, and the total production from the fields remains almost the same from month to month. With the United States taking an active part in the War, the consumption of oil is bound to increase. Even at the present rate of draft upon storage the present stocks of oil will be exhausted in about two years. And it is entirely possible that the War will last longer than that. Since every well in the State that is capable of producing an appreciable amount of oil is now being pumped to the limit, increased drilling is the only way to increase production. There are, however, several obstacles to an active drilling campaign, namely, increased cost of labor and increased cost and actual scarcity of material, especially casing. The increased cost of labor and material, serious as it is, is largely compensated by increased prices and, in any case, there are several companies in the Californian fields that possess a sufficient quantity of both patriotism and financial strength to view the question in its broadest aspect. The question of the supply of casing is, however, a more serious matter.

Generated on 2024-09-30 01:24 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The first use for iron and steel at the present time, is, undoubtedly, in the manufacture of munitions for ourselves and our Allies. Next to be considered are the needs of the railroads and steamship lines that must now do their utmost to transport munitions and supplies. After these requirements are supplied, supplying the oil-fields must be considered, along with, say, the demands of the manufacturers of agricultural machinery. Whether or not such an arrangement will furnish enough casing and other steel material to the oil companies, remains to be seen. If not, there is, doubtless, some disused casing in the fields that can still be recovered, in spite of the thoroughness of the salvaging operations of the past few years. Some of this 'junk' casing could be used in new holes where conditions were such that it was not likely to receive hard usage.

INCREASE of oil production could also be furthered by Congress itself, if it will simply pass a leasing-bill or other measure that will permit the development of the unpatented oil-producing land. Legislation of this character failed to pass at the last session, largely because of the opposition of the Navy Department, which desired to hold all the land within the so-called naval reserves for the future needs of the Navy. Now the War is upon us and there is danger that supplying the present needs of the Navy will be hampered on account of this policy of pseudo-conservation.

TRANS-BAY bridges and tunnel projects are considered in the report of the Board of Engineers that conducted the hearings on this subject last summer, and also in a letter from General William M. Black, Chief of Engineers of the War Department, both of which documents have recently been made public. The report of the Board of Engineers, composed of Colonel T. H. Rees, Colonel C. L. Potter, and Major G. B. Pillsbury, recognizes that any bridge that would be practicable from financial and other considerations, would be a source of some hindrance to navigation, but calls attention to the statement of Mr. Robert Dollar at the original hearing, that even a draw-span would be more acceptable to the shipping interests than a continuation of the present system of ferry-transportation. In general it is stated that a tunnel would be preferred if navigation alone were considered, and a bridge would be more satisfactory to the land-transportation and other interests involved in the discussion.

TUNNELS, the report states, should be so constructed that if the tidal prism is reduced at one point, a compensating increase, by dredging or by other means, should be made at some other point. With regard to fixed-span bridges, it is tentatively suggested that the minimum width of clear span of 1800 feet be required with a vertical clearance of 210 feet for a distance of 800 feet in the centre of the span. While the report does not discuss the question, it seems probable that the Fowler plan could be modified to comply with this recommendation. In the case of the Rush suspension-type bridge, attention is called to the danger of failure of the entire bridge resulting from the failure of a single span. If the plan of the Associated Bridge Engineers for a low-level bridge with a few higher spans in the main lane of navigation and including a draw-span for the highest vessels is adopted, it is recommended that the bridge be constructed so that it will be possible, at some future time, to modify the draw-span so as to provide for a vertical clearance of 230 feet for a distance of 300 feet. It is also recommended that tugs be provided by the bridge-company to assist vessels in passing through the draw. With these recommendations the report gives a somewhat qualified approval to the plan of the Associated Bridge Engineers.

HOWEVER, this and the other bridge-plans proposed are definitely dismissed in the letter from General Black in which it is stated that no bridge of any kind should be allowed north of Hunter's Point, and no low-level bridge between Hunter's Point and San Mateo. A high-level bridge between these two places should have at least three high wide spans. No definite statement regarding the height and width that would be required by the War Department is given, but attention is called to a recommendation of 220 feet clearance made in 1913 by the late E. L. Corthell regarding bridges in the vicinity of New York. This recommendation is based on the existence of wireless-masts on steamers now operating, ranging in height from 190 to 220 feet. It is suggested that a tunnel will be the best solution of the problem, or possibly a modification of the plan proposed by Mr. John G. Little for a combined bridge and subway. Nevertheless, as will be seen from the letter of Mr. Charles Evan Fowler, appearing in another column, the bridge-advocates are not discouraged.

EFFICIENT municipal government is something that has seemed an almost unattainable ideal in the United States, and writers on political economy have frequently called attention to superior methods in other countries. In particular, during the period when German methods were popular, praise was given to the German custom of promoting the mayor of a small city who had proved himself capable, to have charge of the affairs of a larger city. It is probable, however, that the present American system of having the mayor a resident of the municipality over which he presides will continue in force, but no such limitation applies to the comparatively new office of city manager, and Alameda, California, has called Mr. Charles E. Hewes to that position. Mr. Hewes was city manager of Alhambra for several years, and when the position of city manager was created in that city, about two years ago, was appointed to that office. He performed his duties so well that he has been drafted to take charge of the affairs of the larger city. Such incidents are encouraging and point to the ultimate attainment of efficiency by democratic systems of government.

Generated on 2024-09-30 01:25 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

DISCUSSION

The Transbay Bridge

The Editor:

Sir—The recent decesion of the Chief of Engineers in regard to a crossing of San Francisco bay clears the atmosphere in a remarkably satisfactory manner, by making it plain that no bridge will be built within the limits where a bridge would be of any service for rapid transit, unless it follows closely the span and clearance that was provided in the Goat Island scheme. Such a structure is practically impossible at any point except at Goat Island, and at any other situation a costly bridge would not pay in any sense of the word.

While the report seems to point to the construction of a tunnel as the method that must be used for a rapid-transit crossing of the bay, careful consideration will convince anyone that such a method will not be satisfactory and will never be constructed if the proper investigations are made and the matter given the thorough attention that it must receive before financial assistance can be secured.

The people of the Bay cities should profit by the experience of New York and other large cities that have tried tunnels to their sorrow; cities that, if given another chance, would undoubtedly put their millions into great bridges. Conditions have changed completely since the advent of the automobile.

The interests of navigation are naturally of the greatest importance to the Federal Government and are usually given consideration to the practical exclusion of the needs of traffic across a bridge. If the people of the Bay cities get together and come to an agreement as to just what is desired, they will be able to convince the Government officials of the justness of their claims.

The fundamentals underlying the problem of rapid transit for the Bay cities must first receive the most profound consideration, and must be solved before there is any real chance of reaching a proper solution of a rapid-transit system.

First and foremost, the real estate operators must abdicate, and allow the business interests of all the Bay cities to take charge of the making of a Greater San Francisco, so that the supremacy of the Golden Gate will not be endangered further. Study the conditions that existed in New York prior to the consolidation, and consider the position that has been attained by Greater New York since the former petty rivalry has been eliminated. Observe the commanding position that has been reached by Pittsburg since local strife was abandoned, in the consideration of the needs of Greater Pittsburg. Consider what is going to happen to San Francisco if petty strife continues to dissipate the energy that is needed in the struggle to keep pace with the younger giants of the north and south.

There are men big enough in all the Bay cities to realize and admit the truth, and to work together for the common good. Big enough to see that the harbor problems are common to both sides of the bay, and that they should be under one control. The logical place for the expansion of San Francisco harbor is on the Oakland side, where the scheme known as the Rees harbor-plan is laid out. There is no need for the great transpacific liners of the future to dock south of Goat island, although they would have free access to all parts of the bay by passing underneath the Goat Island bridge, with its 2000-ft. spans and its 210-ft. clearance. The fact is that even now the docks for great steamers are in that part of the bay toward the Presidio, and no violence will be done to the feelings of any one by continuing the good work.

Does San Francisco still hope to command the Pacific? Does she still hope to dominate the Coast? If she does, then let her be ready to start a Greater San Francisco movement and bring it to a speedy fruition, through reasonable concessions from all.

Let not the people waste time on deciding who it was discovered the Golden Gate; let them make sure that it does not have to be re-discovered. Let them see that there is no need for a far-away bridge at or beyond Hunters Point; that there is no place for a dark tunnel that cannot be ventilated; and that a tunnel is dangerous anywhere, and particularly so across San Francisco bay.

CHARLES EVAN FOWLER.

Seattle, April 18.

The Tamping Process of Excluding Water From Oil-Wells

The Editor:

Sir—It is with pleasure that I note the letter on 'Exclusion of Water from Oil-Wells,' by H. W. Bell, in the March number of WESTERN ENGINEERING. I have used the tamping process on about 30 wells in the Olinda district, and since Mr. Plotts' retirement from the field, I had supposed that I was the only operator in the State that thought favorably of this method.

I regard the tamping-process as the ideal method of shutting off water and the only sure way. Cement has the advantage of being easier to place, but is liable to failure on account of (1), the cement failing to set, (2) pipe-leakage, (3) well-walls slacking away after the cement sets and the well is put on the pump. Tamping avoids all of the above difficulties, and has the additional advantage when begun at the oil-sand and carried to the top of the hole, of keeping all the water in the formation originally found, and not allowing it to penetrate to the lower levels. It also avoids all danger of collapse and 'elbowed' pipe, resulting from shifting formation.

Generated on 2024-09-30 01:33 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

I usually tamp the string of casing with which the well is finished. Where a well has 6, 8, 10, and 12½-in. casings in the hole, the 8, 10, and 12½-in. strings are removed in turn as the well is tamped. I use cement and sand the first hundred feet, then sand only. I prefer to have several hundred feet of sand tamped below the last water, but I know, from actual experience, that in one well, 40 ft. of sand has held a 1600-ft. head water for the past 13 years, and that sand even under slight pressure will hold water. This fact may be observed when sand is placed in a leaky tank. My deepest tamping-job was begun at 3600 ft. When stops are needed, I use a canvas bag placed on the lower joint of the tamping-string. This bag fills with sand and cement and forms an excellent 'bridge.'

I have never used rosin, as I have not had conditions that seemed to make it necessary. I formerly used a mixture of clay and sand, but now use only sand, except as noted for the first hundred feet. I notice on page 213 of the Report of the Oil and Gas Supervisor, the statement that tamping can be used only when the casings can be removed. This would be desirable, to be sure, but I had occasion to tamp one well with two solid strings of 10-in. 42-lb. casing and 8¼-in. 36-lb. casing, which were perforated and a 4½-in. string tamped in with a 6-in. pipe.

WILLIAM J. TRAVERS.

Fullerton, Cal., April 3.

Design of Flumes

The Editor:

Sir—In your April number appears an article on 'Timber Framing,' by Henry D. Dewell, in which he takes exception to a statement of mine in *Engineering News,* December 21, 1916, that "it is a waste of lumber to place battens on the inside of a flume." He states further that "placing battens on the outside is not common practice on the Pacific Coast."

In Oregon and Washington at least the practice of putting battens on the inside of a flume is fast going out of date. The results of experience have proved the inefficacy of inside battens and the superiority of outside battens. A little thought will convince one at once of the advantages of the outside battens.

The disadvantages of the inside battens are:

1. They increase the friction coefficient, both directly and by aiding the accumulation of sand and silt and the growth of moss and other aquatic vegetation.

2. They have an almost negligible effect in preventing leakage. To seal a wooden flume effectively, the fine silt must lodge in the joints, which, with the swelling of the wood, effect the seal. Any silt that finds its way into the joints of a flume with inside battens is immediately washed away by the escaping water. Any well-built flume will seal itself in time by swelling of the wood, but, in nearly all cases, the leakage while this seal is being made, cannot be allowed on account of the damage to foundations. This is particularly true of flumes in intermittent service, as in irrigation practice.

The advantages of the outside battens are:

1. There is no obstruction in the inside of the flume.

2. They will effectively hold silt in the joints, and reduce the leakage to harmless proportions while the wood has an opportunity to swell and effect a permanent seal.

3. If water is turned out, and the flume becomes dry, the silt remains in the joints. Upon re-filling, the leakage is not nearly so great as in the other case where the dried silt-ribbon, if it forms at all, drops out as soon as the pressure at the joint is removed by drying of the wood.

4. If unusual leakage occurs it is readily stopped by calking with oakum, and the batten forms an effective stop against which to calk. With the inside battens, calking is almost impossible.

It is true that it costs slightly more to place battens on the outside, but it is well worth the extra expense. Rather than place battens on the inside of a flume, I would much prefer to omit them entirely and save the cost of material and labor.

I wish to call attention to two features of Mr. Dewell's flume-design: One is the idea of gaining the side-posts into the sills and top-ties. Swelling of the side-plank will lift the side-post out of the gain in the sill entirely or reduce the bearing-surface to dangerous proportions. Gaining, dapping, and mortising, should always be avoided wherever possible on account of the cost. It is never necessary on a flume of the proportions shown. The large flume used at the Exposition is a much better design. In this both side and bottom planks have an opportunity to swell tight, being confined at both edges. This flume was probably built of seasoned lumber, and would have remained just as tight without either batten or spline.

The other feature of his design is the unnecessary use of stringers, except for a very high trestle. Four-foot bents with sills resting directly on the posts are generally much cheaper than eight-foot bents with stringers. This is true in most cases to heights of 20 feet, water surface to ground. Local circumstances may alter this, but it is well to figure the cost of both methods before building.

J. C. STEVENS.

Portland, April 18.

[A copy of Mr. Stevens' letter was submitted to Mr. Dewell and the following reply received.—EDITOR.]

The Editor:

Sir—Mr. Stevens' comments on the advantages of placing the battens on the outside of a timber flume are interesting, and well worthy of consideration. The choice between the two methods can best be made after all advantages and disadvantages are balanced, one against the other; and which method is the better is largely a matter of opinion, with the majority, I believe, on the side of the inside battens.

With regard to Mr. Stevens' criticism of the small flume design, published in my article, there is considerable foundation for his criticism, although I consider that he has somewhat exaggerated the ill effects of the

Generated on 2024-09-30 01:24 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

swelling of the side-planks. However, I do not consider the detail there shown as necessarily the best that can be made, and am willing to agree that, in general, it is better to avoid the daps. Incidentally, the design shown is not my own in any particular; it is a design prepared by three consulting engineers of more than local reputation. I used it merely as an illustration of one type of flume. Possibly I can take some credit from Mr. Stevens' comment on the details of the large flume used at the Exposition; since this design was my own. On account of the head of water in this case, dapping of the posts into the sills was out of the question.

H. D. DEWELL.

San Francisco, April 24.

Corrosion of Iron and Steel

The Editor:

Sir—With reference to the article on the 'Corrosion of Iron and Steel' appearing on page 118 of the March number of WESTERN ENGINEERING, I would submit the following data as tending to controvert the conclusions expressed in that article.

An article by Sir Robert Hadfield appearing in the *Journal* of the Iron and Steel Institute, Volume LXXXV, pages 179-180, gives data regarding ancient cingalese iron, dating back to the fifth century, and shows the analysis of a bill-hook containing 0.012% copper, a chisel containing 0.090%, and a nail 0.119%. In later comments on these analyses he states: "As regards the effect of copper in adding resistance to corrosion, all the specimens are more or less alike, whereas if this element has any influence, the nail ought to have shown less corrosion than the others. I think, therefore, you are right in not accepting the theory that the addition of copper will enable iron and steel to resist corroson."

J. L. Campbell, engineer of maintenance of way for the El Paso & Southwestern Railroad, has written several articles which appeared in the *Bulletin* of the American Railway Engineering Association, in which he has shown that the addition of copper is not beneficial to steel which is exposed to the action of either cinder and salt, cinder and soda, loam and salt, or loam and soda, and has shown that steel containing but a trace of copper shows less loss than steel containing up to 1% copper.

Leslie Aitchison, of the Metallurgical Department, Sheffield University, in a paper read before the Faraday Society, May 11, 1915, and also in a paper read before the same society December 8, 1915, has shown that the addition of copper to steel is not beneficial from a corrosion standpoint, the steel being tested in tap-water, salt water, and dilute sulphuric acid. Mr. Aitchison obtained the following results, expressed in loss of weight in grams per square centimetre multiplied by 100:

Material	Tap-water	Salt water	Sulphuric acid, 1%	Sulphuric acid, 10%
Low-manganese steel	0.875	1.085	2.88	7.02
Steel containing 0.48% copper	1.030	1.860	15.10	58.30

In summarizing the results Mr. Aitchison says, "The question of the corrosion of the steels containing copper is one still very much under debate. The present figures show that corrosion in sodium chloride (common salt) is considerably increased by the presence of copper, and in the 1% acid there is a general increase."

In 1915, W. F. Whitaker took from an irrigation-weir near Bakersfield, California, certain nails that had been driven at widely separated intervals of time. These nails were afterward sent to J. A. Aupperle, chief chemist of the research laboratory of the American Rolling Mills Co., and analyzed by him. The results of the analysis were as follows:

	Small nails of copper-bearing steel driven in 1900	Large nails of plain steel driven in 1900	Cut iron nails driven in 1888
	%	%	%
Sulphur	0.033	0.025	0.035
Phosphorus	0.006	0.021	0.020
Carbon	0.170	0.015	0.080
Manganese	0.370	0.042	0.410
Silicon	trace	0.216	trace
Copper	0.460	0.030	trace

The nails driven in 1888, and containing only a trace of copper, were in excellent condition, the large nails driven in 1900 and containing a relatively small amount of copper were in good condition, while the small nails driven in 1900, and containing 0.46% of copper, were badly corroded.

An article appeared February 12, 1913, in *Engineering & Contracting*, and also in the November 7, 1912, issue of *Engineering News*, by G. C. Whipple and Allen Hazen, in which the authors conclude that the addition of copper to steel does not increase resistance to corrosion. Also, "The general results of immersion test go to show that where the action is emphatically a chemical one, as in the case of a strong acid test, the presence of copper tends to reduce the action, but where, as in the test with weak dissociated acid and salt, the electrolytic form of corrosion predominates, copper does not reduce corrosion, but on the other hand tends slightly to stimulate it."

B. G. MARSHALL.

Middletown, Ohio, April 12.

Municipal Cement Plant of the City of Los Angeles

The Editor:

Sir—On account of absence from home, my published communication together with that of Mr. Heinly and your editorial, all of which appeared in the February number of WESTERN ENGINEERING, were not called to my attention until now. Since Los Angeles county has been compelled to close down the Monolith cement-plant, on account of the depletion of the general fund, after the present supply of clinker on hand has been used up, there is little more to be said concerning the matter. This action is a virtual admission of everything charged against the Monolith cement-plant.

There is, however, one thing in Mr. Heinly's reply

Generated on 2024-09-30 01:28 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

which I desire to notice. He interprets my statement as being to the effect that the city has not purchased cement from the Monolith plant, because private cement manufacturers have been able to underbid the county. It is clear from the context of my communication that I meant to say that the city could not so purchase it, unless the county should sell it at a loss.

Furthermore the conditions of bidding have been such in some instances as to give an artificial advantage to the county as against private manufacturers. One such instance was where the bids were rejected on the mere technicality that the certified check was not large enough to cover the cost of the cement bags, which were not purchased by the city, but were to be returned to the seller, in order to eliminate a private cement company, which underbid the county.

Also, quite recently, the city, in connection with its work on water distribution in the San Fernando valley and re-construction of portions of the Los Angeles aqueduct, has adopted the policy of asking for the price of cement at the mills of the different manufacturers. As freight rates to different points from different mills are not the same, it thus becomes possible to purchase from the Monolith plant by assuming that the cement is to be used at some point nearer to it than to the private plants. Such an instance has been noted by me within the last few months, when the city advertised for cement f.o.b. factory and, when the bids were received, awarded the contract to the Monolith plant by adding freight to Saugus, thus making the Monolith cement seem the cheapest. When the cement was shipped, however, it was taken to points in the San Fernando valley, either by re-shipping, or otherwise transferring it from Saugus. If it had originally been figured for San Fernando Valley points, the bid of private cement-makers would have been the lowest.

With reference to the statement that the price of cement quoted by private manufacturers dropped from $2 per barrel to $1.48 to $1.56 after the Monolith plant was constructed, several years ago I was informed by one of the then public service commissioners that the private cement companies offered to sell cement at a lower price before the Monolith plant was constructed than they did afterward. In any case the difference is more than outweighed by the useless investment of nearly $1,000,000 in the Monolith plant.

F. C. FINKLE.

Los Angeles, April 16.

The effect of the tide upon the suitability for irrigation of the water of the lower parts of the Sacramento and San Joaquin rivers is discussed in the annual report of the California State Water Commission. During flood stages the water in the rivers is fresh nearly to the bay itself, but as the rivers fall, the influence of the tide becomes more marked and the water in the rivers becomes too salty for irrigation at a considerable distance from their mouths. The California-Hawaiian Sugar Refining Co. at Crockett sends a tank-barge up the river daily, in order to obtain a supply of fresh water for industrial purposes. It is sometimes necessary to go as far up-stream as Antioch, 25 miles, before a suitable supply of water can be obtained. This condition is likely to become worse with the increased use of water for irrigation on the upper parts of the rivers.

THE MARIETTA COMPRESSED-AIR PROCESS FOR INCREASING PRODUCTION OF OIL-WELLS

The Smith-Dunn or Marietta process for increasing the production of well in an old field by forcing air down one well among a group was discussed by J. O. Lewis of the U. S. Bureau of Mines at a recent meeting of the Petroleum Club of the University of California. This method was developed at Marietta, Ohio, and is now used extensively in the Appalachian fields and also in some of the Oklahoma fields. It has been tried in California by the Montebello Oil Co. in Ventura county, but was abandoned. Where it has been successful, the average increase of production has been 300%, and in some cases as great as 900%. It should, however, be stated that the average production of wells in the districts where the process has been used is less than one barrel per day.

Where the method is used, one producing well in a group is selected as an air-well. Best results are usually obtained when there is one air-well to three pumping wells. The air is forced down the air-well through a string of tubing with a packer at the end. It is important that the air does not have access to the stratum above the oil-sand. The pressure used is about 150 lb. per sq. in., varying somewhat with local conditions. From 5000 to 20,000 cu. ft. of free air per well per day is needed. From 1½ to 2 hp. per well is required. The pumping-wells are operated as usual, either by jacks or on the beam.

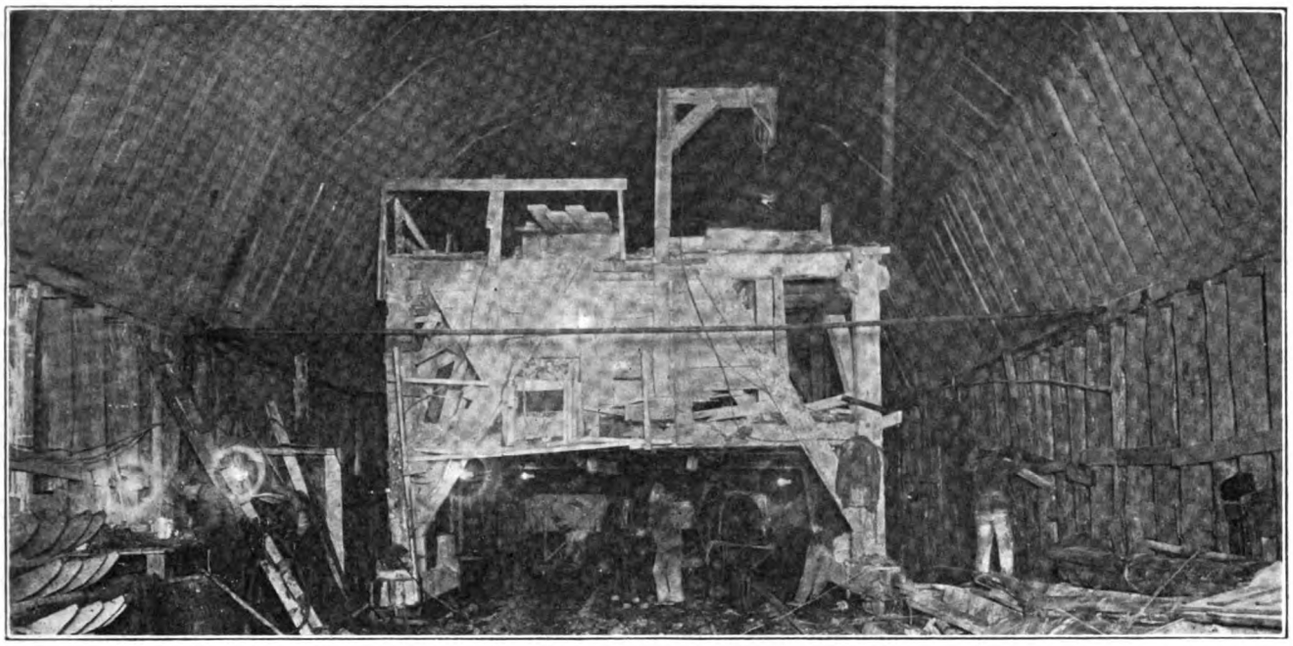
The air takes up the volatile constituents of the oil in the form of vapor and is caught and used in the gas-engines required to operate the property. It is possible that this air might be used successfully for making casing-head gasoline.

The first effect of the use of this process is an increase of gas from the pumping-wells. Then follows an increase in water, and finally an increase in the oil production. Frequently the full effects on the oil production will not be seen for several months. There is also an increase in the amount of sand.

The cost of installation of this process is from $100 to $150 per well. There is also an increased cost of maintenance of from 25 to 50%. This process is sometimes used in connection with vacuum-pumps on the producing-wells, but since the limit of vacuum is about 10 lb., most operators prefer to carry more pressure on the air-compressors.

As has already been noted, this process has been successful on wells of very small production, and whether or not it would be of value for Californian conditions remains to be demonstrated.

Generated on 2024-09-30 01:26 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

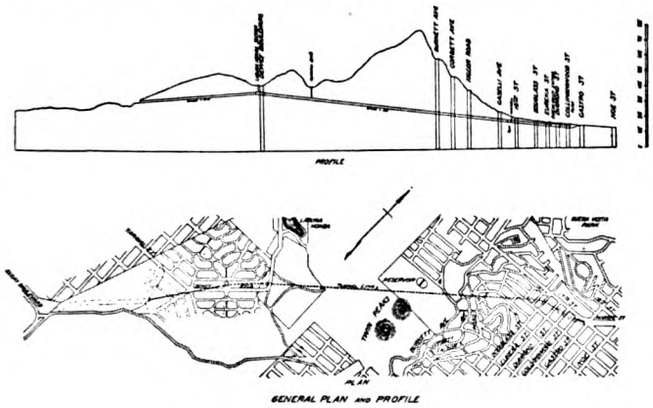


EXCAVATING BENCH AND TIMBERING

The Twin Peaks Tunnel

On April 7, 1917, the two crews driving the Twin Peaks Tunnel headings from the easterly and westerly portals, met underground practically in the middle of the tunnel. When the alignment was checked it was found that the error was only 0.01 ft. The elevations checked within 0.04 foot.

Twin Peaks tunnel was undertaken to provide a channel for street-railway traffic to the 10,000-acre residence



GENERAL PROFILE AND PLAN

district, that is rapidly developing between the Twin Peaks ridge and the ocean in the south-west corner of the city of San Francisco. Funds for the construction were obtained from two assessment districts, one adjacent to the westerly portal, containing an area of 4153 acres, contributing approximately $3,400,000, and the other adjacent to the easterly portal, containing 660 acres, contributing approximately $600,000. The average assessment was $0.02 per sq. ft., the maximum, $0.035 per sq. ft., and the minimum, $0.005 per sq. ft. Assessments are payable at the option of the property-owners, either all at one time or in ten annual installments with interest at the rate of 7% on deferred payments.

From portal to portal, the completed bore is practically 12,000 feet in length. The width is 25 ft. in the clear and the clear height above the top of the rail, 15 ft. At the easterly portal, provision has been made for a connection with a future subway which will extend from the tunnel down Market street to the ferry.

Immediately west of the easterly portal is a large underground waiting-room, known as Eureka Valley station, which will ultimately be a transfer-point where passengers can change from surface to subway cars, or vice versa. For this underground station a steel-beam structure was adopted. The platforms are 300 ft. long to accommodate four-car trains, and connect at either end with stairways leading to the surface.

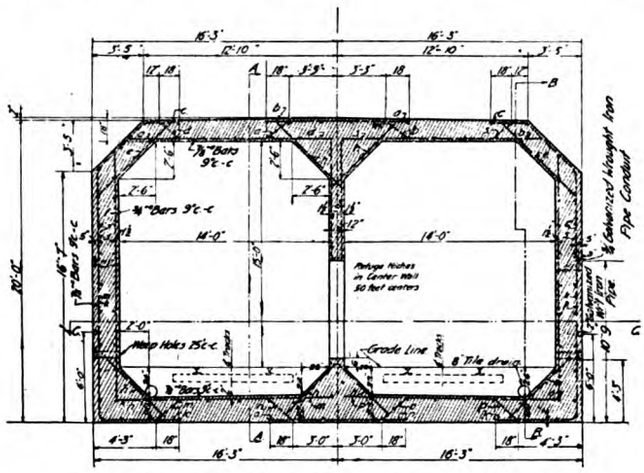
From the easterly portal the tunnel ascends on a 3% grade, compensated to 2.8% on curves, for a distance of 9000 ft. to a summit elevation of 436 ft. At the end of the 3% grade, the Laguna Honda station has been constructed. This is a two-story structure, the lower floor being at the tunnel elevation, 62 ft. below the ground surface, and the second story at the ground-level. From Laguna Honda station the tunnel drops westerly on a 1.15% grade for a distance of 3000 ft. to the westerly portal.

The principal factors influencing the selection of the rate of grade from the easterly portal to Laguna Honda

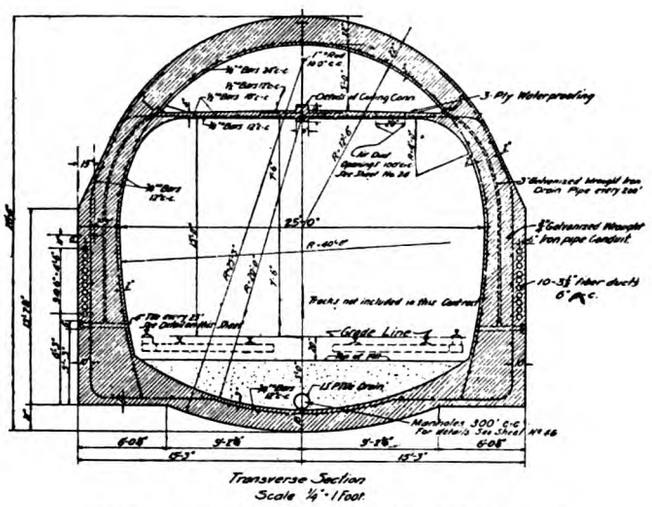
Generated on 2024-09-30 01:27 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

station were, first, the desirability of having the underground station as close to the surface as possible, and second, the necessity of operating trains through the tunnel at high rates of speed. The first consideration required the use of as steep a grade as possible, while the second fixed the maximum grade at 3%.

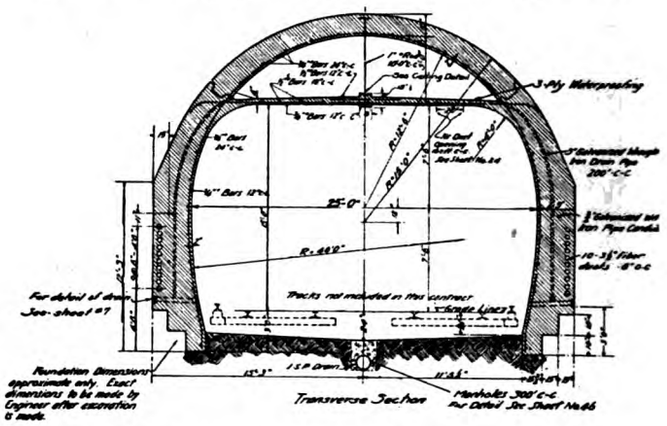
The Laguna Honda station is 300 ft. long. Two platforms, each 10 ft. wide, have been provided, one to accommodate east-bound, and the other west-bound traffic.


Refuge Holes in Center Wall 50 feet centers
Grade Line
6" Tile drain
Manhole 300' C-C For detail see Sheet No 46
Transverse Section
Scale ¼"=1 Foot

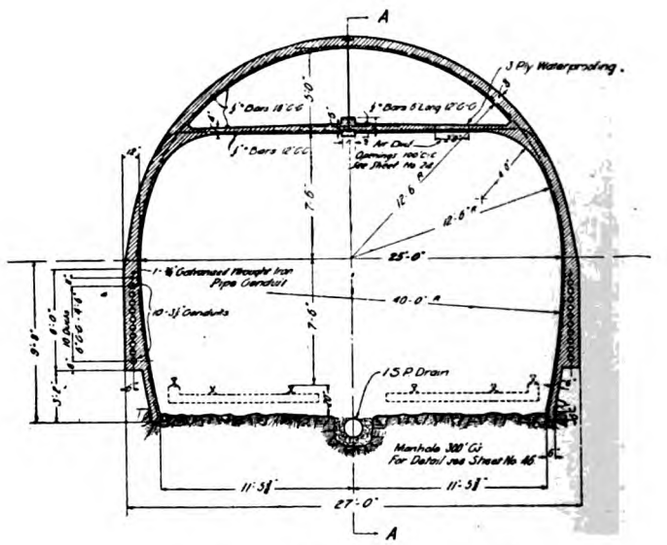
FLAT-TOPPED SECTION IN EARTH AND SOFT MATERIAL


3-Ply Waterproofing
Tracks not included in this Contract
Grade Line
Manholes 300' C-C For detail see Sheet No 46
Transverse Section
Scale ¼"=1 Foot

STANDARD SECTION FOR EARTH AND SOFT MATERIAL



STANDARD SECTION FOR SOFT ROCK



STANDARD SECTION FOR HARD ROCK

Unlike the Eureka Valley station, where proximity to the surface required the flat-slab type of roof, Laguna Honda station has an arched roof with a clear span of 44 ft. At this station, elevators will operate between the tunnel and the surface. A stairway and incline have also been provided. A contract will shortly be awarded for the construction of a double-track electric railway through the tunnel. The total cost of this railway will be about $275,000.

The tunnel will be ventilated by electrically-driven blowers, one near the Eureka Valley station, the other at a shaft on the Relief Home tract. These blowers will pump air through vertical circular vent-shafts to an air-duct formed between the upper part of the tunnel-arch and a suspended reinforced concrete slab-ceiling extending the entire length of the tunnel. From this ventilation duct it will be allowed to escape through dampers placed at intervals into the tunnel proper. Eleven fibre-ducts will traverse the entire length of the bore in recesses in the tunnel-walls. At intervals of 50 ft. on alternate sides, niches have been constructed for incandescent lighting and to serve as refuge-bays for track-walkers.

An obstruction, presenting some difficulty, occurred about 1800 ft. from the west portal. A brick-lined water-duct of the Spring Valley Water Company constructed in 1865 crossed at an acute angle 8 ft. above the tunnel-arch. It was conveyed by means of a by-pass over the completed tunnel. A shaft was sunk, the water-duct tapped by a 30-in. pipe, which ran west 275 ft. in a drift previously driven, crossed the tunnel at right angles, and connected with the original duct again. Later the water was permitted to follow the original course.

Excavation for Laguna Honda station and 22 ft. of tunnel section at each end was done in open-cut, the maximum depth being 70 ft. Steam-shovels carried the cut to 15 ft. above rail grade, the sides of the pit being retained by piles. Trenches were then dug by hand for the side-walls and footings of the station, after which

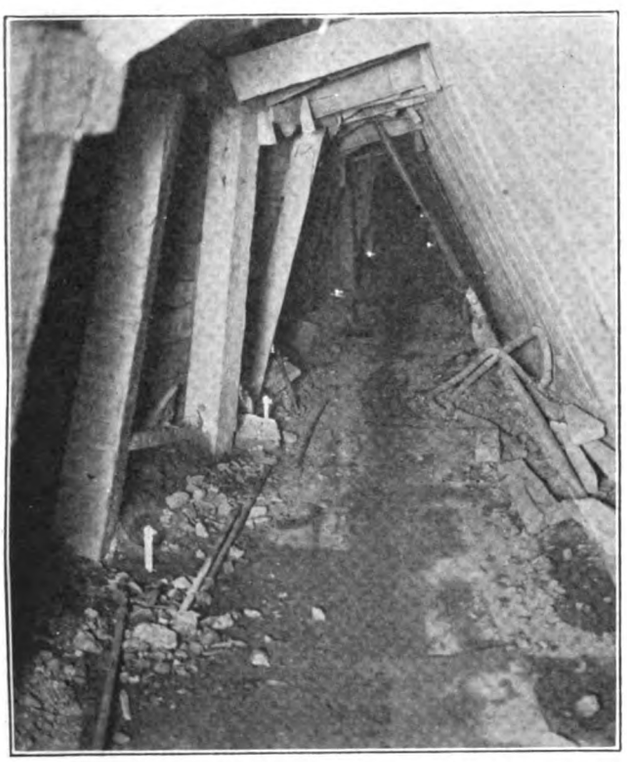
Generated on 2024-09-30 01:28 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

the concreting was done and the core of earth removed. The waste material, a sandy clay, hauled an average distance of ⅓ mile in motor trucks, was used in filling low portions of the valley in which the station is built.

Because of an ascending grade, excavation between

EXCAVATING CROWN DRIFT

the vent shaft on the Relief Home tract and the Laguna Honda station was started from the former point. The shaft when completed will have an inside diameter of 13 ft. but the excavation was made 20 by 32 ft. so as to



TIMBERING FOR SIDE-DRIFT RUN AT SPRINGING-LINE

take in the full width of the tunnel-section and to permit construction of forms for concreting. From the bottom of this shaft, 100 ft. deep through water-bearing sand and timbered with piles held by 12 by 12-in. bracing and walings hung with steel hangers, a drift was carried 300 ft. westerly at invert-grade through sandstone. At this point it broke through the sandstone into a water-bearing sand, requiring 300,000 gal. per day to be lifted at the shaft. Another drift was then started and kept in the sandstone until after the sand deposit was passed, when the second drift was brought up to line with the first one.

Excavation for the section between the east portal and a point 500 ft. south-westerly therefrom, was done between two rows of piles and heavy timbering with the necessary cross-braces. This ground was a filled-in creek bed and the 30,000 cu. yd. of excavation was removed by pick and shovel.

The tunnel was designed and is being constructed under the direction of M. M. O'Shaughnessy, city engineer of San Francisco. Contract for the work was awarded to R. C. Storrie & Co., of San Francisco, on their bid of approximately $3,372,000. A complete schedule of the unit bids appeared in WESTERN ENGINEERING, for December 1914.

Hydro-electric plants in operation in California on December 1, 1916, according to the annual report of the State Water Commission, were as follows:

Watershed	No.	Capacity, hp.
Pacific Coast drainage north of San Francisco bay	7	24,321
Pacific Coast drainage south of San Francisco bay	11	18,304
Great Basin drainage from east slope of Sierra..	17	57,580
Sacramento River drainage	20	239,725
San Joaquin River drainage	20	261,936
Total	75	601,866

In addition to the hydro-electric plants, there are auxiliary steam-plants with a capacity of 377,000 hp. Hydro-electric plants with a capacity of 160,000 hp. are under construction and plants with a capacity of 759,000 hp. are proposed. During 1915, the output of the hydro-electric plants was 1,826,462,000 kilowatt-hours and of the steam plants 315,016,000, making a total of 2,141,-478,000 kilowatt-hours.

Preservative coatings for galvanized flumes were investigated by Fred D. Pyle, manager of the Uncompahgre Valley project for the U. S. Reclamation Service. The following paint and tar mixtures were used, African black, Egyptian black, elastic graphite, green graphite, coal-tar compound, coal-tar, and green paint. After six months, the coal-tar, coal-tar compound, and elastic graphite were the only coatings that were in good condition, the coal-tar being the best.

Electrical discharges for stimulating the growth of crops are being investigated on an experimental farm of about 70 acres near Hereford, England. Earlier experiments on small tracts of about 1 acre planted with oats have shown an increase of 50% in the yield of grain and 85% in the yield of straw.

Steel pipe produced in the United States in 1888 was negligible, while 500,000 tons of wrought-iron pipe was produced. In 1905, 938,193 tons of steel pipe and 452,-797 tons of wrought-iron pipe was produced, and in 1915, 2,037,266 tons of steel pipe and only 262,198 tons of wrought-iron pipe.

Generated on 2024-09-30 01:26 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Concrete Road Construction*

The edge of the concrete slab next to the shoulder should be vertical and square cornered. Then if it becomes necessary to construct macadam shoulders, a good joint can be made. More important still, if additional widening is required, it can be accomplished with a longitudinal joint of minimum size. In New York several miles of concrete roads has been widened in accordance with this design by adding four feet or more to one or both sides of the pavement. Where the soil is unstable, crushed stone or gravel shoulders, 4 to 6 in. deep and 1½ to 3 ft. wide, should be made. Although this gives good results, and makes for additional safety, still, if there is much traffic, the maintenance-cost is so high as to justify the additional first cost of a wider pavement.

In order to obviate the danger of accidents on 16-ft. roads, we have been widening the curves, so that in some cases for those of small radius at the centre the actual curve is as much as 22 to 24 ft. wide. We have also considered it good practice to give the outside of these curves a super-elevation in order to make easier the steering of a car, to lessen the likelihood of skidding, and to insure greater safety in taking these curves at speed. This has been opposed as inducing people to travel round these curves at high speed, but speeding seems to be an inherent mania, unrelated to external conditions, and it is certain that banked curves lessen the casualties resulting from it.

Cracking of a concrete pavement is due generally to the unequal settlement of a poor sub-grade. If the road is to be satisfactory it is of first importance that a good sub-grade be secured. The essentials of a good sub-grade are as follows:

1. It must have uniform bearing-power. If an old road-bed is to be used it must be scarified, re-shaped, and re-rolled for the entire width of the pavement, removing all large stones to a depth of 6 inches.

2. It must be dry. Ditches should be low enough to take away the water from under the pavement. With unstable soil, good results can be secured by providing sub-drains and spreading a layer of gravel, preferably run-of-bank, over the sub-grade to increase its stability. Material used for this purpose must be impervious; if it is porous it will act as a reservoir during wet periods, which, under conditions of frost, will break the pavement proper.

3. It should have metal reinforcement in the following cases (*a*) under bad soil-conditions; (*b*) wherever the supporting power of the sub-grade changes; as from rock to earth, or in passing over a trench. Experience in New York indicates that the expense of reinforcement is not justified in gravelly or sandy soils where good natural drainage prevails.

The mixture should be proportioned in such a manner as to give the greatest density; a 1:1½:3 mixture is usually best. The concrete should be mixed in the proportions of 1 volume of cement to 4½ volumes of sand and broken stone or gravel. The proportions of fine and coarse aggregate should be varied as a result of field tests so that the greatest density is obtained. Should the size or character of the materials change there would be a corresponding change in the proportioning of the mixture.

The coarse aggregate should consist of a well-mixed product of clean No. 1, No. 2, and No. 3 stone or gravel. No. 1 size is that retained on a ⅜-in. and passing a ⅝-in. circular screen. No. 2 size is that retained on a ⅝-in. and passing a 1½-in. circular screen. No. 3 size is that retained on a 1½-in. and passing a 2¾-in. circular screen. Not more than 25% of the total shall be No. 1 size, the proportions being so graded as to give a minimum of voids.

These specifications allow, as the maximum size, stone that will pass a 2¾-in. ring, whereas most specifications permit only 1½-in. stone as a maximum. Just as good, if not better, results may be obtained from using the larger stone, and at a cost decidedly lessened by using more nearly the product of the crusher. Especially is the price to be considered on contracts where the local supply is crushed on the ground. From a practical standpoint a pile of stone graded from ¾ to 2¾ in. has more stability when properly mixed than stone graded from ¾ to 1½ in. Greater density can be obtained by using stone up to 2¾ inches.

Concrete-pavement sand should be such that 100% should pass the ¼-in. screen, not more than 20% a No. 50 sieve, and not more than 6% a No. 100 sieve. However, where more than 20% of the sand passes a No. 50 sieve, if it is graded to give a low proportion of voids, and conforms to all other requisites, special permission for its use may be given by the chief engineer. Sand may be rejected if it contains more than 5% of loam or silt. All sand to be acceptable should have a compressive strength equal to Ottawa sand when tested in a proportion of one part of cement to three parts sand at the same age, same consistence, and using the same blend of cement as for Ottawa sand in the same proportions. It must be free from organic matter and coating of grains.

The concrete should be mixed in approved mechanical batch-mixers. Mixing should be continued at a speed of not less than ten revolutions nor more than sixteen revolutions per minute, for at least one minute after all materials are in the drum and before any discharge is made.

*Abstract of paper read before the American Road Builders' Association, Boston, Mass., February 8, 1917, by H. E. Breed, deputy commissioner of highways, Albany, New York.

Generated on 2024-09-30 01:27 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Central-Power and Jack-Pumping Plants for Operation of Oil Wells*

By ROY M. BARNES†

A central-power and jack system for pumping oil-wells is one in which power is transmitted from a central plant to the surrounding wells by purely mechanical means.

The pumping of oil-wells from a central power-station was a gradual development, as is shown by the number of patents allowed on different systems between 1875 and 1885. Most of the early systems were based on an oscillating motion, either a 'pull-wheel system,' or a 'push-and-pull' system. The various pull-wheels were actuated by pitmans connected with horizontal or vertical rotating shafts. The earliest systems were developed in the Franklin and Oil Creek districts in Pennsylvania. In a typical plant the two ends of a vertical band-wheel were cranked so as to drive two horizontal pitmans. The pitmans were connected to a circular horizontal table in such a manner as to perform one-fourth of a revolution and then return to its former position. To the circumference of the horizontal table, from 2 to 15 connections were made in such a way that the corresponding wells were pumped by connection to the pitman and walking-beam at the well. The pull came on the down-stroke of the pump.

The first use of jack-systems in the Californian fields was when a pumping-jack at one well was operated by means of a 'jerk-line' attached to the crank at an adjacent well. Some of these systems are still in use. The introduction of a central pumping-power usually occurs after the development days of a field are past, and it is found necessary to reduce production-costs because of decline of production. The old Los Angeles City field was the first of the Californian oilfields in which the central power made its appearance. The other Coast fields and the Kern River field followed, and later the older parts of the fields on the west side of the San Joaquin valley. During this time, pumping by jacks has been adapted to a greater range of service, because of improved methods and heavier construction.

At the present time, pumping by means of a central power and jack-system is adapted to the operation of old wells, where there is little trouble from either sand or water, and where the output is declining. The following are the conditions to which this method is suited:

(1) Depth. Up to 1500 ft. in California, 2500 ft. in Eastern fields where the oil is lighter.

(2) Gravity. 14° Baumé and lighter.

(3) Frequency of cleaning required. Up to twice a month.

(4) Production, 5 to 125 bbl. per day.

(5) Position of wells. Any compact group.

(6) Topography. No limitation.

Before proceeding further let us consider briefly the construction and operation of the oil-well pumps. Although varying in structural details, the mechanical principle of all of the plunger-pumps used in oil-wells is practically the same. These pumps consist of the following parts:

1. A 'working-barrel' polished on the inside, which is screwed into the end of a 'string' of tubing, or else between joints of tubing at or near the bottom of the well. In Californian practice the diameter of the tubing is usually 2, 2½, or 3 in., and the diameter of the working-barrel conforms with this.

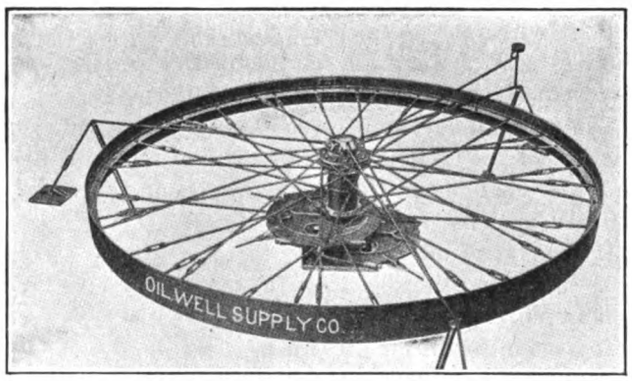


FIG. 1. BAND-WHEEL TYPE OF CENTRAL POWER

2. At the bottom of the working-barrel, the 'standing-valve,' which is a ball-valve in a cage, is attached.

3. Within the working-barrel is fitted a cylindrical plunger, polished on the outside.

4. On top of this plunger is the 'working-valve,' which is another ball-valve in a cage, at the top of which the 'sucker-rods' are attached.

The plunger and working-valve are given a vertical reciprocating motion by means of the sucker-rods, which, in California, are made of ¾ or ⅞-in. steel with joints about 20 ft. long. These sucker-rods extend through the tubing to a connection with a polish-rod, which passes through a stuffing-box at the upper end of the tubing and connects with the walking-beam or the pumping-jack, as the case may be.

In considering one complete stroke of the pump, let us assume that the plunger is at its lowest position, with both ball-valves closed. When the up-stroke begins, the upper or working-valve remains closed be-

*Abstract of thesis prepared for the Department of Civil Engineering of the University of California and based on an extensive field investigation.

†Care General Petroleum Corporation, Taft, California.

Generated on 2024-09-30 01:23 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

cause of the weight of oil above it. The lower or standing-valve opens because of the oil and gas-pressure, and the tendency to produce a vacuum within the working-barrel. When the plunger has reached its highest position, the working-barrel, theoretically, is full of oil, and both valves are momentarily closed. When the down-stroke begins, the lower valve remains closed, while the upper valve is forced open, and the oil passes through it. On the up-stroke following, this oil is raised in the tubing.

In California, the practice is to pump with a 15 to 35-in. stroke, at a rate of 15 to 30 strokes per minute. Using 3-in. tubing and a working-barrel with an internal diameter of $2\frac{3}{4}$ in., a 23-in. stroke, and at 20 strokes per minute, the theoretical maximum production is 400 bbl. per day.

The gas-pressure in a well has the effect of forcing more oil into the working-barrel, and of raising the oil in the tubing. Consequently, a well that produces considerable gas may sometimes produce more oil than the theoretical capacity of the pump. On account of the viscosity of the oil and the sand and other foreign matter pumped with the oil, the working-barrel will not fill with oil. Because of this and also because of slippage, the amount of oil pumped is usually much less than the theoretical capacity of the pump.

The relation between the stroke, frequency, and production of the well is dependent upon the well itself, and will change with the changing conditions within the well, such as:

1. Gravity of oil.
2. Sand conditions.
3. Gas pressure.
4. Amount of water present.
5. Condition of pump and valves.
6. Strength of rods.

This makes it necessary to study each well continually, in order to obtain, not necessarily the maximum production, but the production most consistent with the best results on the entire property.

The load is fluctuating, especially in a deep well. When the pumping is done by a steam-engine, the latter is run directly on the throttle, and without a governor, so that the fluctuation is greater than with a gas-engine, motor, or pumping-jack. A non-uniform stroke with a slower speed on the up-stroke than on the down-stroke, throws less strain on the rods, but a regular movement raises more oil, and makes cleanings less frequent.

Cleaning or 'pulling' a well must be done at regular intervals in order to arrest the decline of production, and to replace worn-out parts in the pump. It is seldom that more than 10 hp. is required for pumping a well, even on the beam, while about 20 hp. is needed for pulling the pump and rods, and 25 to 30 hp. for pulling tubing.

A central-power and jack-pumping plant may be divided into three parts, the central power-plant, the transmission lines, and the pumping-jack at the well.

The Central-Power Plant. Steam power has been used, but either the gas-engine or the electric-motor is now preferred. Where the wells on the property produce enough gas to run the plant, as is usually the case, the gas-engine is generally chosen.

The push-and-pull system already described is used in a number of cases although modified considerably from the earlier installations. A single-disk power can handle from 6 to 20 wells, with depths ranging from 1000 to 2000 ft. depending upon the gravity of the oil. A double-disk power can handle from 14 to 25 wells, the depths ranging from 1600 to 2500 ft. In general this type of power cannot handle as many wells as the eccentric system.

In the eccentric system there is a pull on the up-stroke of the plunger at the well, and no push on the down-stroke. The down-stroke is caused by the weight of the column of oil on the plunger and the weight of the sucker-rods, assisted by any counter-balanced weight-boxes that may be necessary. There are two types, the band-wheel type and the geared-wheel type.

The band-wheel is placed with the shaft vertical, and is driven by a belt from the prime-mover, which is given a quarter-turn by an idler. The eccentrics that give the required motion to the rods leading to the wells are fixed on the shaft of the band-wheel. The band-wheel may be made of either steel or wood. The heaviest type of steel band-wheel is designed to handle forty 1500-ft., twenty 2500-ft., or fifteen 3000-ft. wells. Geared wheels are usually designed for lighter service than band-wheels. They are provided with one, two, or three eccentrics, and are usually mounted in an iron frame.

The prime mover, if a motor, is generally connected to a counter-shaft by a belt or chain-drive, and thence to the pumping-power by a quarter-turn belt over an idler or belt-tightener. By varying the size of the pulleys on the counter-shaft and the speed of the motor or the gas-engine, the desired number of strokes per minute is obtained at the pumping-power. The counter-shaft should have a friction-clutch for starting wells after the prime-mover has been brought to regular speed. In case a motor is the prime mover, a controller and starting rheostat can be used.

The counter-shaft pulleys may be designed by the following formula:

$$\frac{brn}{Ra} = N$$

Where b = radius of small counter-shaft pulley.
a = radius of large counter-shaft pulley.
n = speed of motor, revolutions per minute.
r = radius of motor-pulley.
R = radius of band-wheel.
N = speed of band-wheel or number of strokes per minute.

Assuming that $b = 10$ in., $n = 865$, $R = 108$, and $N = 18$, then $\frac{10 \times 5 \times 865}{108 \times 18} = 22.2$ in., radius of counter-shaft pulley.

Generated on 2024-09-30 01:30 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The belt or chain-drive between the prime-mover and the counter-shaft causes little trouble. It is the main belt between the counter-shaft and the band-wheel that should receive the most attention and study. Of rubber belts, a 12-in. 6-ply rubber belt has been found to give the best service; prepared canvas belts are also being used with gratifying results. Foundations for both prime-mover and pumping-power should be of concrete. Not more than 2½ hp. is needed for pumping each well connected with the central-power.

Transmission Lines. While some wooden shackle-rods are still in use, steel rods or cables are preferred. Where new material must be bought in either case, rods are cheaper than cable. Usually there is, however, a lot of old drilling cable around a property that can be used, and this cable, which has had the 'stretch' taken out of it, is even better than new cable. On the other hand, old sucker-rods can sometimes be used. Irrespective of cost, rods have the disadvantage of crystallizing and breaking and are not so suitable as cable where a long stroke and a fast motion is required. On the other hand, rods last longer than cable and are better for long lines, although it is advisable in such lines to insert stretches of cable about 100 yd. long in all at intervals in order to 'take up the pound.'

Fig. 2 shows the line-hardware required for a jack-pumping system. If rods are used instead of cable and the vibration in the line is great, some modification in the connection between the piece of hardware and the line may be required, as the vibration is likely to crystallize the connection. The cable or rods are usually babbitted into the connection.

Line Structures. While the design of the power-end and the pumping-end is left mainly to the oil-well supply companies, the design and construction of the line structures is usually done by the oil companies themselves. Consequently there is a considerable variation in design, and only what seems to be the preferred practice will be described in this article.

Hold-up posts should be placed at approximately 25-ft. intervals and buried 4 ft. in the ground. They should be of 4 by 4-in. timber, the average length being from 5 to 10 ft. according to the topography. Oregon pine, redwood, or cedar may be used. If Oregon pine is chosen, oil-sand, or earth mixed with oil should be placed around the posts to help prevent decay. All posts should be painted with oil once or twice a year. The shackle-line passes through a slot in the upper end of the post. This slot should be kept greased. Near the power-head, where there is considerable 'side-sweep' to the line, it should be boxed in at the top of the post instead of running through a groove.

Throw-offs. It is often desirable to discontinue pumping a well for a time. This is done by means of a 'throw-off' at the end of the power-pull rod. The most satisfactory type is shown in Fig. 9. A small hook is

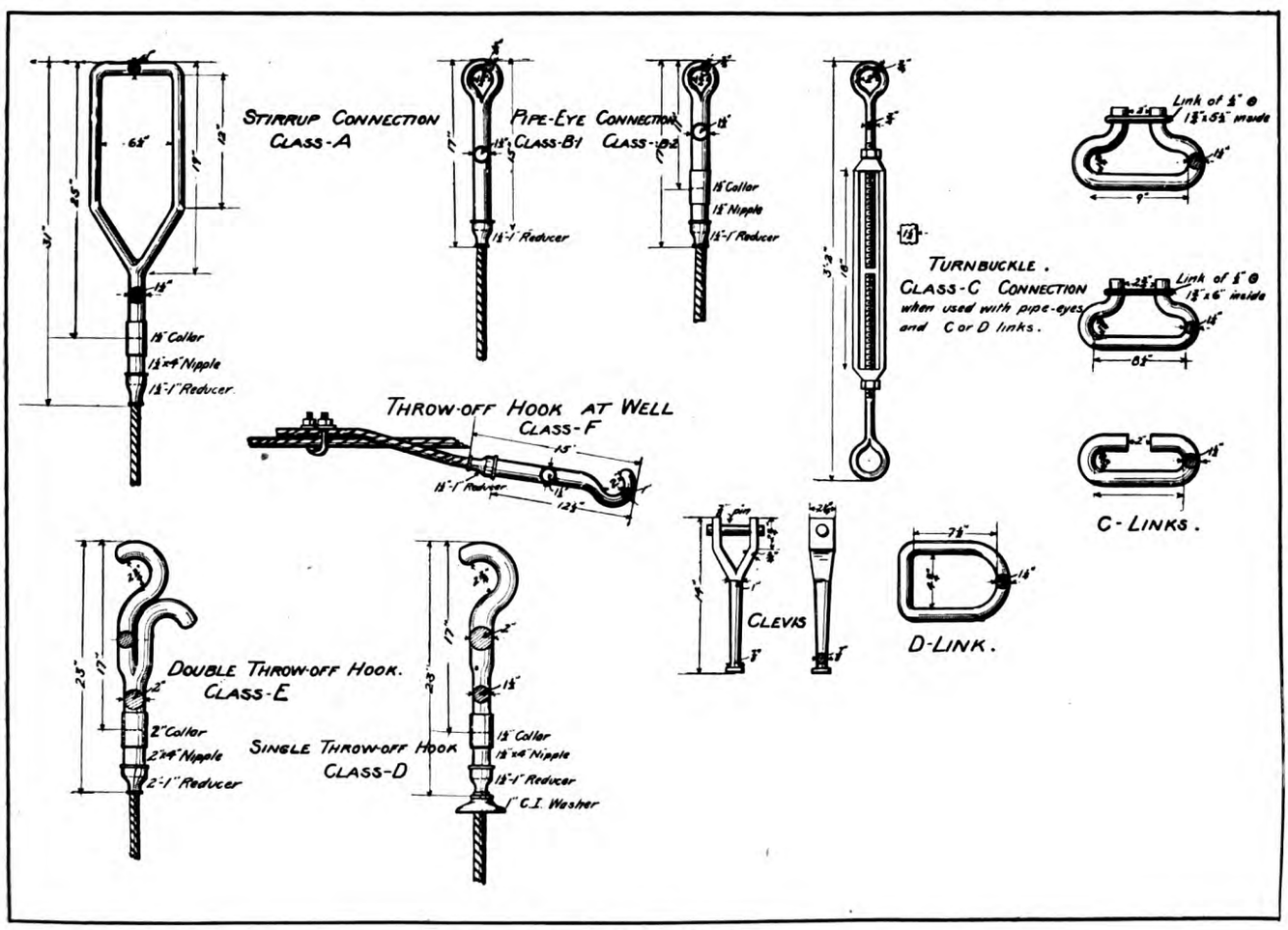


FIG. 2. LINE-HARDWARE

Generated on 2024-09-30 01:27 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

also used at the well to keep the line taut when disconnected from the pumping-jack.

BILL OF MATERIAL FOR 'THROW-OFF'

LUMBER		
One 2 by 12 in. by 8-ft. redwood post	$0.64	
Two 6 by 8 in. by 5 ft., cedar		
One 2 by 8 in. by 2 ft., cedar		
One 4 by 4 in. by 20 ft., cedar	2.80	
One 6 by 8 in. by 8 ft., Oregon pine	1.12	
One 2 by 8 by 24 in., hardwood	0.60	
		$5.16
HARDWARE		
One ½ by 6-in. machine bolt	0.03	
Two ½-in. cut washers	0.01	
One 2-in. single throw-off hook, complete	2.45	
One 1-in. cast-iron washer	0.08	
		2.57
Total material		$7.73
Labor		5.25
Total		$12.98

Redwood and cedar are assumed to cost $40, pine $35, and hardwood $225 per M. B.M. In this and the following tables the cost data should be regarded as only approximate. The lumber will weigh about 485 and the hardware about 30 lb. At the well there should be a single throw-off hook complete costing $1.05 and two wire-line clamps, costing $0.50, or $1.55 in all.

Multipliers are used for the following purposes:

1. To increase or decrease length of stroke between the power and the well.

2. To increase length of stroke to compensate for the amount lost in sagging lines.

3. To change direction of the shackle-lines in a vertical plane.

4. To aid in crossing over or under a road. There are two types, the pendulum or surface type, shown in Fig. 3 and the rocker or underground type shown in Fig. 4. In the rocker-multipliers, the swing-post casting should be placed from 12 to 18 in. below the surface. It should be boxed and the boxing banked with oil-sand. While it is advisable to have as long a lever-arm as possible, the swing-post castings should not be set too deep, as this makes either oiling or repairs difficult. As it is best to keep the lines as near the ground as possible, this type of multiplier is best adapted to rough country, and even there it will generally be better to use a pendulum-multiplier. As will be seen from the bills of material below, the pendulum-multiplier is the cheapest, and it should be used wherever the conditions will permit.

BILL OF MATERIAL FOR ROCKER-TYPE MULTIPLIER

LUMBER		
Four 2 by 12 in. by 5 ft., redwood	$1.60	
Two 6 by 8 in. by 5 ft., cedar	1.60	
Eight 2 by 12 in. by 2 ft., Oregon pine		
One 6 by 8 in. by 8 ft., Oregon pine	2.24	
		$5.44
HARDWARE		
Two 1½-in. stirrups, complete	$4.70	
Two stirrup-plates	0.60	
Four ¾ by 10-in. hook-bolts	0.60	
One set swing-post castings, complete	12.00	
Eight ¾ by 8-in. machine-bolts	0.32	
Eight ¾-in. cut washers	0.04	
		18.26
Total material		$23.70
Labor		5.50
Total		$29.20

The lumber will weigh 340, and the hardware 255, a total of 595 pounds.

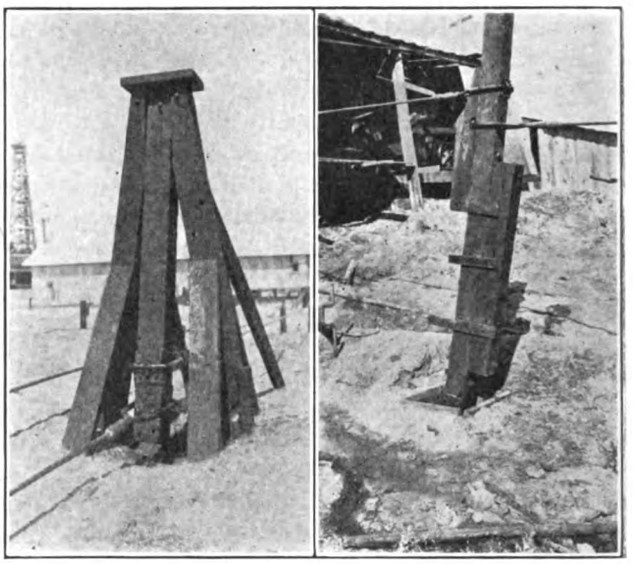


FIG. 3 AND 4. PENDULUM AND ROCKER TYPE MULTIPLIERS

BILL OF MATERIAL FOR PENDULUM-TYPE MULTIPLIER

LUMBER		
Two 2 by 12 in. by 4 ft., redwood	$0.64	
Three 6 by 8 in. by 4 ft., cedar		
One 2 by 8 in. by 4 ft., cedar	3.40	
Two 4 by 4 in. by 12 ft., cedar		
Two 6 by 8 in. by 8 ft., Oregon pine		
One 6 by 8 in. by 7 ft., Oregon pine		
Four 2 by 6 in. by 4 ft., Oregon pine		
One 2 by 12 in. by 18 in., Oregon pine	3.89	
		$7.93
HARDWARE		
Two 1½-in. stirrups, complete	$4.70	
Two stirrup-plates	0.60	
Three ½ by 9-in. machine-bolts	0.12	
Four ¾ by 10-in. hook-bolts	0.60	
Four ¾-in. cut-washers	0.02	
Six ½-in. cut-washers	0.02	
One 1½ by 16-in. nipple	Nominal	
		$6.06
Total material		$13.99
Labor		6.25
Total cost		$20.24

The following table, calculated for structures similar to Fig. 3 and 4, gives the length of stroke at the well-end for a given length of stroke at the power-end, and known distance between stirrups on the multiplier. For an increase in stroke the power-line is the closest to the swing-post casting, and for a decrease in stroke, the well-line is the closest. In both types of multiplier, the outer stirrup should be kept 6 in. from the end of the post, and the inner stirrup moved for regulation.

Generated on 2024-09-30 01:24 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Distance Between Stirrups In Inches.	Length of Stroke from Power End, in Inches								
	16	17	18	19	20	21	22	23	24
1	16¼	17¼	18¼	19¼	20¼	21¼	22¼	23¼	24¼
2	16½	17½	18½	19½	20½	21½	22½	23½	24½
3	16¾	17½	18½	19¾	20⅞	21⅞	22¾	23¾	24¾
4	16¾	17¾	18¾	19¾	20¾	22	23	24	25
5	17	18	19	20	21¼	22¼	23¼	24¼	25½
6	17	18¼	19¼	20¼	21½	22½	23½	24½	25¾
7	17¼	18½	19½	20½	21¾	22¾	23⅞	25	26
8	17½	18¾	19¾	20¾	22	23	24	25¼	26¼
9	17⅞	18¾	20	21	22¼	23¼	24½	25½	26½
10	18	19	20¼	21¼	22½	23½	24¾	25¾	27
11	18¼	19¼	20½	21½	22¾	23¾	25	26	27¼
12	18½	19½	20¾	21¾	23	24¼	25¼	26½	27½
13	18¾	19¾	21	22	23¼	24½	25½	26¾	28
14	19	20	21¼	22½	23½	24¾	26	27¼	28½
15	19¼	20¼	21½	22¾	24	25	26¼	27½	28¾
16	19½	20½	21¾	23	24¼	25½	26¾	28	29
17	19¾	20¾	22	23¼	24½	25⅞	27	28¼	29½
18	20	21	22¼	23½	24¾	26	27¼	28½	29¾

TABLE I. LENGTH OF STROKE AT WELL FOR ROCKER-TYPE MULTIPLIER, WITH DISTANCE FROM PIVOT TO OUTER STIRRUP EQUAL TO 7 FT. 6 IN.

Distance Between Stirrups In Inches.	Length of Stroke from Power End, in Inches								
	16	17	18	19	20	21	22	23	24
1	16¼	17¼	18¼	19¼	20¼	21¼	22¼	23¼	24½
2	16½	17½	18½	19½	20½	21⅝	22¾	23¾	24¾
3	16¾	17¾	18¾	19¾	21	22	23	24	25
4	17	18	19	20¼	21½	22¼	23½	24½	25½
5	17¼	18¼	19½	20½	21½	22¾	23⅞	24¾	26
6	17½	18¾	19¾	20¾	22	23	24	25¼	26¼
7	17¾	19	20	21¼	22¼	23½	24½	25¾	26¾
8	18	19¼	20½	21½	22¾	23¾	25	26	27¼
9	18½	19½	20¾	22	23	24¼	25¼	26½	27¾
10	18¾	20	21	22¼	23½	24½	25¾	27	28¼
11	19	20¼	21½	22¾	23¾	25¼	26¼	27½	28¾
12	19½	20¾	22	23	24¼	25½	26¾	28	29¼
13	19¾	21	22¼	23½	24¾	26	27¼	28½	29¾
14	20	21½	22¾	24	25¼	26½	27¾	29	30¼
15	20½	21¾	23	24½	25¾	27	28¼	29½	30¾
16	21	22¼	23½	24¾	26¼	27½	28¾	30	31½
17	21¼	22¾	24	25¼	26¾	28	29¼	30¾	32
18	21¾	23	24½	25¾	27¼	28½	30	31¼	32½

TABLE II. LENGTH OF STROKE AT WELL FOR PENDULUM TYPE MULTIPLIER, WITH DISTANCE FROM PIVOT TO OUTER STIRRUP EQUAL TO 5 FT. 8 IN.

Assuming a shackle-line consisting of rods with consequently no stretch, let us find the arrangement in order to increase the stroke from 18 in. at the power to 24 in. at the well, using a J & H jack, which does not permit multiplication at the well.

This would be done by two multipliers along the line, or a multiplier and counterbalance that will multiply, allowing 3 in. to each. If a rocker-multiplier is used to change from 18 to 21 in., the distance between the stirrups is found from the table to be 13 in. Using a pendulum-multiplier for the change from 21 to 24 in. the distance is 8½ inches.

For road-crossings, an overhead structure with two 'hold-up' posts can be used provided the line is high enough. Other overhead crossings are unsatisfactory. For an underground crossing, a pendulum-multiplier makes the best structure. The bill of material is the same as for a multiplier, with the addition of a joint of 'junk' casing to go under the road.

Rockers and pendulums are used to change the direction of the line in a vertical plane, when a multiplier is not needed. The feature of this type of construction is the loose block of wood, or 'loose-head,' to which the line is fastened. It works freely with a rotatory motion in a vertical plane, and tends to take up any inequalities or vibration in the line.

Like the rocker-multiplier, the plain rocker is to be avoided whenever possible, the pendulum being the preferred type of structure. The lumber needed for the rocker is the same as for the rocker-multiplier. The hardware is as follows:

Two ½ by 2 by 24-in. straps	$1.00	
Two ¼ by 10-in. hook-bolts	0.30	
Eleven ¾ by 8-in. machine-bolts	0.75	
Six ¾ by 8-in. cut washers	12.00	
		14.08
Total cost material		$19.52
Labor		4.50
Total, labor and material		$24.02

The pendulum is constructed like a pendulum-multiplier, except that the back-braces are omitted.

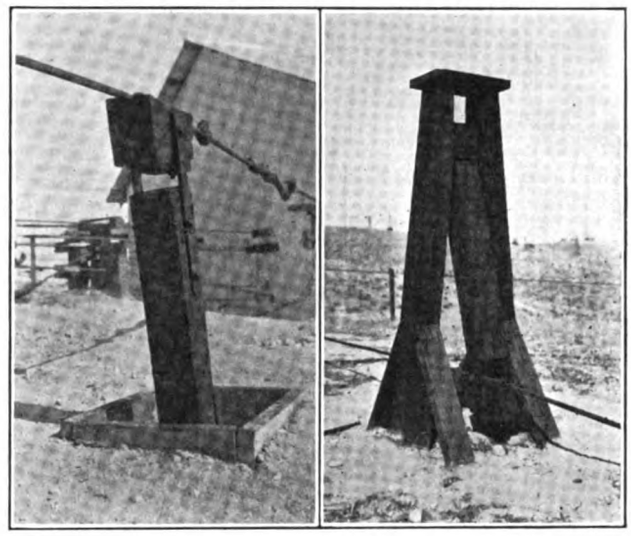


FIG. 5 AND 6. HOLD-UP TYPE OF ROCKER AND HOLD-UP TYPE OF PENDULUM

A 'butterfly' or angle may be used for the following purposes:

1. To change the direction of the line in a horizontal plane in order to get around an obstacle, or to run the line from the power in some other direction than that of the well in order to balance the power properly.

2. To furnish an emergency connection between a well-motor and the jack-pump.

The line should enter and leave the butterfly horizontally. This can be accomplished by the use of either a rocker or a pendulum.

Following is a bill of material for a butterfly:

LUMBER

One 2 by 12 in. by 10 ft., redwood	
One 2 by 12 in. by 12 ft., redwood	$1.76
One 6 by 8 in. by 12 ft., cedar	
One 12 by 12 in. by 6 ft., cedar	

Generated on 2024-09-30 01:24 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

One 6 by 8 in. by 3 ft. cedar		
Two 4 by 4 in. by 12 ft., cedar		
One 2 by 12 in. by 4 ft., cedar	6.88	
One 6 by 12 in. by 18 ft., Oregon pine		
One 6 by 8 in. by 14 ft., Oregon pine		
Two 4 by 4 in. by 14 ft., Oregon pine		
Two 4 by 4 in. by 10 ft., Oregon pine		
Two 2 by 6 in. by 12 ft., Oregon pine	8.68	
		$17.32

HARDWARE

Two 1½-in. stirrups, complete	$4.70	
One set swing-post castings, complete	12.00	
Two stirrup-plates	0.60	
One 1 in. by 12-ft. double-end bolt	1.50	
One 1 in. by 4 ft. 3-in. double-end bolt	0.60	
One 1 in. by 7 ft. 3-in. double-end bolt	1.00	
One ¾ by 15-in. machine-bolt	0.15	
One ¾ by 19-in. machine-bolt	0.20	
Four ¾ by 14-in. machine-bolts	0.50	
Four ¾ by 8 in. machine-bolts	0.20	
Two ¾ by 9-in. machine-bolts	0.12	
Four ¾ by 10-in. hook-bolts	0.60	
Eight ½ by 9-in. machine-bolts	0.40	
Six 1-in. cast washers	0.33	
Four ¾-in. cast washers	0.10	
Thirty-two ¾-in. cut washers	0.14	
Sixteen ½-in. cut washers	0.05	
		23.19
Total cost of material		$40.51
Labor		22.50
Total cost		$63.01

The total weight of lumber is 1200 lb. and of hardware, 400 lb., making 1600 lb. in all. A lighter butterfly can be constructed for places where the service is not so exacting at a cost of $57.62.

Where the angle of deflection is small and the service not exacting, a 'hold-out swing' or horizontal rocker may be used. A 'hold-in swing' as its name implies is the reverse of a 'hold-out swing.' It is not so satisfactory, and should be used only where a 'hold-out swing' is not practical. The bill of material for 'hold-out swing' is as follows:

LUMBER

One 2 by 12 in. by 10 ft., redwood		
One 2 by 12 in. by 12 ft., redwood	$1.76	
One 12 by 12 in. by 6 ft., cedar		
One 2 by 8 in. by 4 ft., cedar		
One 6 by 8 in. by 3 ft., cedar		
One 6 by 8 in. by 6 ft., cedar		
Two 4 by 4 in. by 11 ft., cedar	5.76	
One 6 by 8 in. by 16 ft., Oregon pine		
One 6 by 8 in. by 10 ft., Oregon pine		
One 4 by 4 in. by 16 ft., Oregon pine	4.41	
		11.93

HARDWARE

One set swing-post castings	$12.00	
One ¾ by 15-in. machine-bolt	0.15	
One ¾ by 19-in. machine-bolt	0.20	
Five ¾ by 8-in. machine-bolts	0.20	
Two ¾ by 9-in. machine-bolts	0.12	
Two ½ by 9-in. machine-bolts	0.10	
Two ¾ by 10-in. hook-bolts	0.30	
Twenty-two ¾-in. cut washers	0.10	
Four ½-in. cut washers	0.01	
Four ¾-in. cast washers	0.10	
Two ½ by 12 by 24-in. iron straps	1.00	
		14.28
Total material		$26.21
Total labor		20.00
Total cost		$46.21

A beam is used for the rare occasions when the proper balancing of the power requires that the direction of the line be changed through an angle of 180°. The wear on the swing-post casting is heavy, and breakages are frequent.

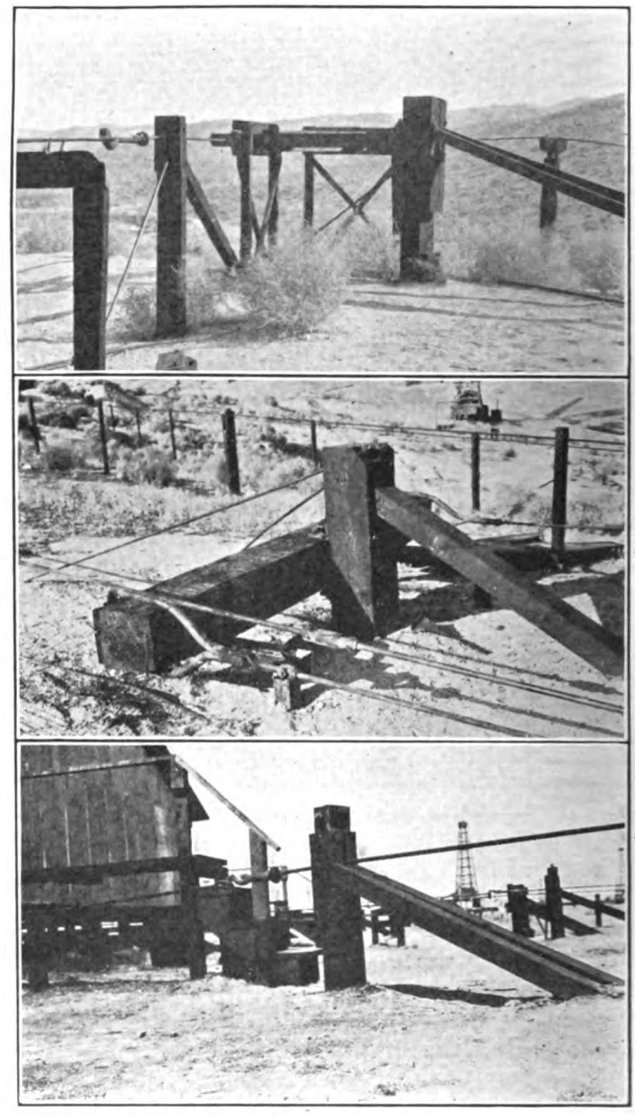


FIG. 7, 8, AND 9. BUTTERFLY, BEAM, AND THROW-OFF

[The conclusion of Mr. Barnes' article will appear in our June number.—EDITOR.]

A list of lakes with an area of over 100 square miles has recently been published by the U. S. Geological Survey. The following Western lakes are included: Great Salt Lake, 1200 square miles (in 1912), Tulare lake, 0 to 800; Salton Sea, 443 (in 1909); Lake Tahoe, 193; Upper Klamath lake, 156, including and 87 excluding swamp-area; Utah lake, 145; Lake Pend Oreille, 124.

Generated on 2024-09-30 01:24 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

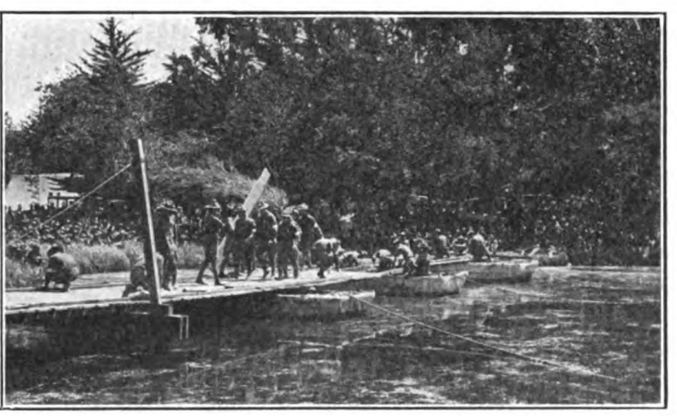
The Engineer Enlisted Reserve Corps of the United States Army

The Engineer Corps in our army corresponds to the famous Royal Engineers of the British army, that branch of the service which builds roads and bridges, fortifications for defense and tunnels for offense, and various other duties. To them is due the wonderful system of field-fortifications that enabled the British to withstand the enemy's onslaught during the last two years and a half. The United States of America is now at war and there is no time to train engineers for such work; the men of the Engineer Corps for the new armies must be taken from the ranks of civil, mining, mechanical, and electrical engineers, as well as machinists and other skilled trades.

TRIPOD WIRE ENTANGLEMENT

TRENCH AND UNDERGROUND APPROACH

BEGINNING TO CONSTRUCT A FLOATING BRIDGE



THREE CANVAS BOATS IN PLACE

The Engineer Corps of the army needs topographical surveyors, sketchers, and instrument-men for the highly important technical work of making contoured military maps of the field of war, laying out battle positions, roads and highways, systems of trenches, and drainage lines.

Topographical draftsmen are wanted to trace the field-maps of surveyors. Mechanical draftsmen will find employment in making drawings of armored trains, armored trucks, and other mechanical devices used in war. Photographers are needed for the reproduction of maps in connection with photographic surveys.

Lithographers, zincographers, blueprint-men, and others skilled in the various processes of reproducing photographs and drawings, are required to reproduce and publish engineer-maps of battlefields and the general theatre of war operations.

Miners and quarry-men skilled in handling explosives and in underground-mining form one of the most important elements in the personnel of the Engineer Corps. The engineers dig the tunnels under the enemy's trenches and destroy them with dynamite and other high explosives. They dig the underground galleries and bomb-proofs that conceal and protect the armies occupying their own trenches.

Military demolitions such as the destruction of bridges, bridge-piers, railroads, and road-beds, as well as land-mines, are effected by the Engineer Corps.

Carpenters and woodworkers of all classes are needed

Generated on 2024-09-30 01:24 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

for the timberwork in trenches and bomb-proofs.

Millwrights and bridge carpenters are especially valuable in the construction of bridges, which the Engineer Corps must build rapidly and of sufficient strength for the passage of army trains, great guns, and for the rapid transport of marching troops over streams and ravines.

Blacksmiths handle the ironwork, including the manufacture of forgings of various kinds in connection with bridge-work, trench-work, military demolitions, and also in the repair of entrenching tools, which the Engineer Corps is called upon to supply to the fighting army.

Plumbers and pipe-fitters lay the pipes in connection with sewage and water-supply systems for the trenches and fieldworks.

Electricians wire the trenches for electric lighting, operate the electric-light plants and power-plants, and operate the great search-lights and other electric illuminating devices used to light the area in front of the trenches. The electrification of barbed-wire entanglements forms a vital element in the defence of modern trenches. For this work electricians are required. Steam and gas-engine operators, fire-men, and machinists are needed in connection with the construction and operation of power-plants, steam and electric pile-drivers, the great caterpillar-trucks, and machine-shops.

Axe-men and millwrights work on the spar-bridges and clear space in front of trenches of trees, brush, wire entanglements, and timber structures.

Boat-men, riggers, and caulkers handle the floating bridge-equipage, which engineers carry in their trains and with which they bridge the widest streams.

Masons and concrete-men construct the permanent work on trenches and gun emplacements, sewage-lines, water-supply, and revetments.

Horse-shoers, farriers, packers, teamsters, and saddlers are needed in connection with the operation of wagon-trains and pack-mule outfits. Every engineer company has a section of 24 mounted men, and these, of course, are picked from among such as know how to ride and understand handling horses or mules.

Clerks, of course, are needed also, as there is a vast amount of clerical detail.

Cooks and assistant cooks are a vitally important element, for obvious reasons, in the personnel of an efficient and contented engineer company.

Musicians and signal-men are neded in every company to blow calls, act as messengers, and do the signalling.

There is hardly a phase of civil engineering-practice that is not carried on during the operations of a company of the Corps of Engineers in war-time.

The illustrations shown herewith are actual photographs of military engineering work conducted by the Corps of Engineers in the field.

The classes of men required may be briefly summarized as follows:

a. Topographical surveyors and sketchers, including instrument-men
b. Draftsmen, topographical and mechanical
c. Photographers and blue-print men
d. Lithographers and zincographers
e. Quarry-men (skilled in explosives)
f. Miners
g. Skilled carpenters
h. Bridge-carpenters
i. Blacksmiths
j. Plumbers and pipe-fitters
k. Electricians
l. Enginemen, steam
m. Enginemen, gas
n. Fire-men
o. Machinists
p. Masons
q. Caulkers
r. Riggers
s. Expert axe-men
t. Boat-men
u. Horse-shoers
v. Farriers
w. Packers
x. Teamsters
y. Saddlers
z. Cooks
aa. Assistant cooks
bb. Clerks
cc. Musicians
dd. Signal-men, as required by Army Regulations

An Engineer Company is composed of 109 engineer-soldiers, graded as follows:

3 Sergeants, 1st Class	1 Horse-shoer
1 Supply Sergeant	2 Buglers
12 Corporals	1 Mess Sergeant
2 Cooks	6 Sergeants
59 Privates	1 Saddler
1 First Sergeant	19 Privates, 1st Class
1 Stable Sergeant	

Sergeants must be at least 30 years old and have sufficient education to perform the duties of the grade, and must hold, in civil life, a position equal to or of the same importance as overseer in the Engineer Department of the Army, and shall be expert in one or more of the special qualifications listed above.

Corporals must be at least 25 years of age and must hold, in civil life, a position equal to or of the same importance as foreman in the Engineer Department of the Army, and shall be expert in one or more of the special qualifications listed above.

Privates must have one or more of the qualifications in the trades listed above.

The rates of pay are as follows:

	Per month
Master Engineer, senior grade	$75
Master Engineer, junior grade	65
Regimental Sergeant Major	45
Battalion Sergeant Major	45
Regimental Supply Sergeant	45
Battalion Supply Sergeant	45
Color Sergeant	36
Sergeant Bugler	40
First Sergeant	45
Mess Sergeant	36
Supply Sergeant	36
Stable Sergeant	35
Sergeant, 1st Class	$45
Sergeant	36
Corporal	24
Cook	30
Bugler	15

Generated on 2024-09-30 01:27 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Horse-shoer	30
Saddler	21
Wagoner	21
Private, 1st Class	18
Private	15

In addition to the pay, all subsistence, equipment, uniforms, and transportation are furnished by the Government.

The War Department desires to secure immediately a large enrollment of enlisted men in this Corps. All enrollments are desired for war service and none will be accepted for less than the period of the War. The recruiting office for the Engineers Section Reserve for Central California is at 204 Pine street, San Francisco, California, and is open every day, including Sunday, and until late at night. As soon as qualified men are enlisted, they will be assigned tentatively to engineer companies, whose personnel will be called later into active service, armed, equipped, and trained as their services are needed at the front. Ten thousand engineers should be raised in California alone, and of these a large number should be secured from among those engaged in engineering and similar occupations in the vicinity of San Francisco bay. Suitable men are urged to make application, either by mail or in person, to one of the following officers:

District Engineer Officer, 204 Pine St., San Francisco.
District Engineer Officer, 723 Central Bdg., Los Angeles.
District Engineer Officer, 602 Burke Bdg., Seattle.
District Engineer Officer, First District, 806 Couch Bdg., Portland.
District Engineer Officer, Second District, 321 Custom House, Portland.
District Engineer Officer, Third District, 405 Custom House, San Francisco.
District Engineer Officer, Eureka, California.

or, to any officer of the Engineer Section of the Reserve Corps, who have already been commissioned or recommended for commission, all of whom are authorized to secure applications.

The following is a list of reserve engineer-officers residing on the Pacific Coast already commissioned or recommended for commission:

CALIFORNIA

Major Seeley W. Mudd, 2232 Harvard Boulevard...Los Angeles
Major Geo. S. Binckley, Central Bdg.....Los Angeles
Major Wm. A. Cattell, Foxcroft Bdg.....San Francisco
Major H. H. Wadsworth, 405 Custom House.....San Francisco
Capt. Carl A. Heinze, 1415 W. 49th St.....Los Angelees
Capt. John A. Griffin, 428 E. 52nd St.....Los Angeles
Capt. F. J. Fitzpatrick .....Fort Rosecrans
Capt. Walter H. Adams, 1661 Rose Villa St.....Pasadena
Capt. K. D. Schwendener, 2158 W. 29th St.....Los Angeles
Capt. J. L. Bacon, 1101 American Nat. Bk. Bdg.....San Diego
Capt. Delmar S. Clinton .....Mill Valley
Capt. C. R. Adams, 912 Griffith-McKenzie Bdg.....Fresno
Capt. Carl E. Grunsky, Jr., 57 Post St.....San Francisco
1st Lt. William Hague .....Grass Valley
1st Lt. C. A. Meyer, 633 W. 18th St.....Los Angeles
1st Lt. Ross Henry Rock, 1443 W. 37th Drive.....Los Angeles
1st Lt. C. C. Bartlett, P. O. Box 308.....Corona
1st Lt. Kirby B. Sleppy, 1019 Florida St.....Los Angeles
1st Lt. Earl W. Fassett, 723 Central Bdg.....Los Angeles
1st Lt. E. E. Schliewen, 927 Gratten St.....Los Angeles
1st Lt. D. J. Young, 935 6th St.....San Diego
1st Lt. Wm. P. Belcher, 405 Custom House.....San Francisco
1st Lt. Charles H. Lee, 1103 Central Bdg.....Los Angeles
1st Lt. E. L. Norberg .....Burlingame
1st Lt. Blaine Noice, 5436 Carlton Way.....Los Angeles
1st Lt. F. L. Weisenheimer, 405 City Hall Annex..Los Angeles
1st Lt. R. E. Whitaker, City Engr's Office.....Los Angeles
1st Lt. Guy B. Donald, 3942 Walton Ave.....Los Angeles
2d Lt. Happer K. Phelps, 731 Wells Fargo Bdg..San Francisco
2d Lt. E. D. Clabaugh, 115 So. Olive St.....Anaheim
2d Lt. Wales MacPerdue, 2734 W. Ave. 31.....Los Angeles
2d Lt. C. F. Toklas, Union League Club.....San Francisco
2d Lt. V. H. Bell .....Calexico

OREGON

Capt. W. D. Peaslee, 125 East 11th St.....Portland
Capt. Henry M. Parks .....Corvallis
Capt. J. T. Kelly, Jr., 711 Pittock Block.....Portland
1st Lt. K. J. Zinck, Box 929.....Portland
1st Lt. John G. Kelly, Jr., 711 Pittock Block.....Portland
1st Lt. C. M. Hurlburt .....Hood River
1st Lt. J. P. Growdon, Pittock Block.....Portland
1st Lt. L. A. Henderson .....Hood River
2d Lt. Paul S. Jones .....Hermiston
2d Lt. Wm. E. Dickinson, 416 Couch Bdg.....Portland
2d Lt. S. J. Benedict, 2651 49th St., S.E.....Portland

UTAH

Lt. Leslie W. Nims, % Utah Power & Light Co..Salt Lake City
Lt. Clarence C. Jacob, 421 Federal Bdg.....Salt Lake City

WASHINGTON

Major S. H. Hedges, 432 Central Bdg.....Seattle
Major Wm. F. Allison, 5264 19th Ave., N.E.....Seattle
Capt. Clarence B. Lamont, Hoge Bdg.....Seattle
Capt., Alfred B. Lewis, 310 Burke Bdg.....Seattle
Capt. John Harisberger, 4015 4th Ave., N.E.....Seattle
1st Lt. C. I. Signer, 1702 Yew St.....Olympia
2d Lt. Edgar R. Perry % Puget Sound T. L. & P. Co.....Seattle
2d Lt. R. F. Dean, % Pacific Power & Light Co.....Seattle

Repair of a broken cast-iron pulley was recently effected by pouring it full of concrete. The pulley, which is one of a pair carrying the main elevator in a large stone-crushing plant, is 54 in. in diameter, with a 20-in. face. In the failure nearly the entire rim was broken, but an extra pulley was not available, and some time was required to secure a new one. To avoid shutting down the plant, a form was built around the remains of the old pulley, using perforated metal, faced with building-paper for the rim and wood for the sides. The belt was left in place, and the whole interior of the form was poured full of 1:2:3 concrete. Pouring was finished at 6 p.m., on Saturday, and the concrete pulley was put in service at 11 a.m. the following Monday. The belt runs directly on the concrete.—*Mechanical World.*

The field for municipal improvements in Russia is shown in a recent article in the London *Times*. There are 1231 municipal areas besides many so-called villages having a population of 20,000 to 30,000. Of the municipal areas, 162 are lighted by electricity and 162 by gas. A 'system of aqueducts' is provided in 219 municipalities; 65 have street-cars, 34 telegraphic communication, and 314 have telephones.

Generated on 2024-09-30 01:25 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Failure in Derrick-Boom Caused by Dry Rot

By HENRY BLOOD*

On January 31, 1917, the boom of a stiff-leg derrick on the Public Auditorium at Portland, Oregon, broke near the upper end and dropped a roof-truss to the street. Two steel-workers were riding to the roof on the truss; one of them fell with it and was killed; the other jumped or was shaken off the truss and escaped serious injury. Besides the truss that was dropped, three other roof-trusses and several roof-beams were damaged. The top of the wall was crushed for a short distance and part of the scaffolding was destroyed. Broken pieces of wood from the end of the boom were found to be seriously affected by dry rot, although the outside appeared to be sound.

The derrick consisted of two stiff-legs placed at right angles to each other, a mast approximately 30 ft. high, and a boom with a reach of 90 ft. The stiff-legs, sills, and mast were composed of 12 by 12-in. square timbers, the bottom of the stiff-leg being 32 ft. from the foot of the mast. One stiff-leg was placed north and south over roof-truss *T*-2 with the mast at the north end and about 40 ft. from truss *T*-4. The other stiff-leg ran east to truss *T*-3. (See Fig. 1.) The main boom was 70 ft. long and 15 to 16-in. diam. at the large end. It was spliced to a length of 90 ft. by lapping another round timber, 40 ft. in length, along the under side and lashing them together at the ends and centre of lap with wire rope. (See Fig. 2.) The contractor stated that the timber was five years old and that when not in use it had been stored in an open yard where it was exposed to the weather. When new, it had been given a coat of linseed oil and one of green paint. He thought that an outside examination would not have indicated unsoundness, and that the steel-workers would not have ridden on the truss if they had considered it unsafe.

There were two lifting-blocks; one at the end of the main boom and one at the end of the spliced length. They had a four-part steel cable. The same line ran through both, so that the strain was divided about proportionately between them. The hoisting-line ran from the lower hoisting-block to a sheave close to the end of the boom (see Fig. 2), followed the top of the boom to the mast, and passed down through the turning-pivot to the engine, which was on the main floor of the building.

The boom was 10½ in. diam. at the tip; it had a vertical slot 2 in. wide by 13 in. long for the hoisting-line sheave, a collar formed of two pieces of 1 by 6-in. metal with 1¼-in. bolts and heavy shackles for the hoisting and boom-raising blocks. There was a ½ by 4-in. strap on each side, hooked around the outer edge of the collar and extending back about 3 ft. Four ¾-in. bolts and a 1½-in. sheave-pin ran through both straps and the timber. There was an old horizontal check extending from the tip to a point beyond the inner bolt, and an old vertical crack running both ways from the sheave-slot, thus dividing the end of the stick into four parts. There was also a large sound knot near the end. The break that caused the accident was close to the inner ¾-in. bolt.

The smaller roof-trusses and beams were piled as delivered near the Third Street wall. A number had

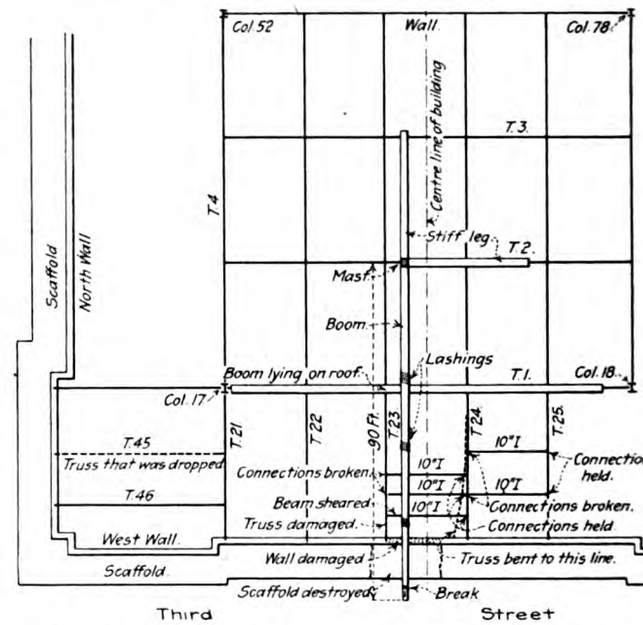


FIG. 1. PLAN OF BUILDING WHERE ACCIDENT OCCURED.

already been raised and set in place, some being as heavy or heavier than the truss in question, *T*-45, which weighed 5100 lb. The wall was 60 ft. high at the point of accident. The truss, *T*-45, had been lifted some distance above the wall and the other roof-framing, and turned at right angles to the wall. The boom was at an angle of nearly 45°. Two or three sharp reports like rifle shots were heard by bystanders a few seconds before the truss reached this position. They appeared to come from the end of the boom. The end suddenly snapped 3 ft. from the tip, the truss dropped on the outer roof-beam, slipped down across the wall and fell to the street, carrying away the scaffolding as it fell. The block and cable went with it, and some cable was reeled from the drum of the engine. The boom dropped to the roof immediately, striking transversely another boom that was lying over truss *T*-1, swung downward violently and split two or three large pieces from the end of the boom, one or two of which fell to the ground.

*Structural engineer, Bureau of Buildings, Portland, Oregon.

Generated on 2024-09-30 01:26 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Some electric wires on poles nearly as high as the wall were broken by the falling truss. The current was conducted to the roof-steel and several workmen in contact with it received shocks. The 10-in. beam that was struck by the truss was sheared off diagonally through the web at that end. Several other beam connections were broken. They had all been bolted temporarily.

An examination of the broken timber showed that it was so affected by dry rot near the end that probably not 25% of the strength remained. Fungus growth was present in some of the splits. There was a thin shell of sound wood outside. Its condition could have been determined by boring a few small holes in it, or probably

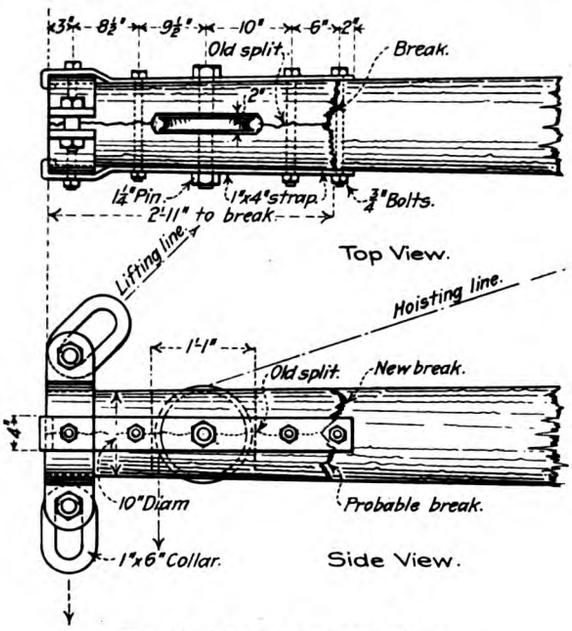


FIG. 2. DERRICK-BOOM AT BREAK.

by percussion. It had probably been strained to the breaking-point by some previous load. The shape of the end connection and the fact that the spliced piece was not in line with the main boom would cause considerable eccentric stress when the boom was in its lower positions. The brake on the engine may have slipped and produced a shock on the cable; it was seen to slip a day or two later.

This emphasizes the lesson taught by a former accident on the Pittock block that derricks and other erection-apparatus should be given more attention by their designers, by contractors, and by city or State inspectors. The various parts should be strong enough to resist any probable combination of direct and secondary stresses that may come upon them in different positions with a reasonable factor of safety. The timbers and cables should be carefully examined before use on each piece of work, and at other regular intervals to see that they are in safe condition. Derrick-timbers should not be left exposed to the weather for long periods when not in use. They are almost certain to be attacked by dry rot. Painting the outside may hasten and not prevent this.

Steel-erectors should as far as possible keep the workmen from riding on loads, and they should be made more responsible by law for the proper construction, care, and inspection of derricks and other erection-equipment. This is not limited to steel structures, but applies to those of other materials; scaffolds on frame buildings are often built insecurely, and some-

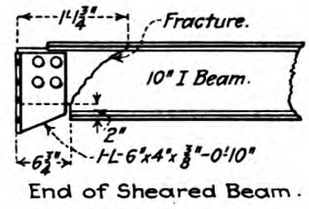


FIG. 3. PART OF SHEARED BEAM.

times cause accidents. Probably most accidents could be prevented by a little care and forethought. It has, however, been the general practice to give consistent attention to the design and superintendence of permanent buildings, and none to the temporary structures used in their construction. It is not right to slight the latter entirely.

ALCOHOL FROM SAWDUST, AND ITS USE AS A FUEL IN INTERNAL-COMBUSTION ENGINES

The possibility of the production of alcohol from sawdust and other wood-waste has recently been discussed by Howard F. Weiss of the Forest Products Laboratory of the U. S. Forest Service at Madison, Wisconsin. A ton of dry sawdust will yield from 20 to 25 gal. of ethyl or grain alcohol. The waste wood and sawdust in the lumber industry is considerably greater than the possible uses for fuel for power requirements.

The calorific power of alcohol is about half that of gasoline but its efficiency is nearly twice that of gasoline. This higher efficiency arises from several causes, the most important being the following:

1. The volume of air required for complete combustion of alcohol is one-third of the volume for gasoline. Consequently less energy is lost in the exhaust. Furthermore, this smaller dilution permits a more perfect mixture, and consequently more perfect combustion.

2. The alcohol-air mixture can be safely subjected to pressures of 200 lb. per sq. in. without spontaneous ignition, whereas the safe limit for gasoline is 80 pounds.

3. All mixtures of alcohol and air containing from 4% to 13.6% of alcohol are explosive, whereas the explosive-range for gasoline is from 2% to 5%, requiring a more careful adjustment of the carbureter.

4. The combustion-products of alcohol are smokeless, and do not clog the cylinders and valves.

Starting in cold weather would, however, have to be done by carrying a small auxiliary gasoline-tank.

Concrete posts are being used in Germany in the hop-fields for carrying the wires upon which the vines grow.

Generated on 2024-09-30 01:23 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Costs of Highway Maintenance in San Joaquin County, California

The county highway system of San Joaquin county was constructed between 1909 and 1912, and comprised 239.92 miles of road. Unlike some other public bodies, the Board of Supervisors of the county recognized the importance of adequate maintenance as well as of good construction, and organized a highway maintenance department in charge of F. E. Quail, county surveyor. An article by Mr. Quail describing the methods of construction and maintenance employed appeared in WESTERN ENGINEERING for September 1915.

Since the completion of the system the State Highway Commission has taken over 34.05 miles of road, and will ultimately take over 32.74 miles more. The character of pavement upon the highways constructed under the bond issue and still in charge of the county highway maintenance department is shown in Table I.

In addition the department has taken over the maintenance of 96.43 miles of county road not constructed under the bond issue. The character of pavement on these roads is shown in Table II.

TABLE II

DECEMBER 31, 1916

		Water bonded gravel	Water bonded macadam	Oiled macadam	Totals
13.	McKinley avenue	3.63	....	....	3.63
24.	Bird	4.00	....	....	4.00
25.	Howard	3.50	12.23	....	15.73
26.	Bethany-Lammersville School	4.00	....	....	4.00
27.	Bethany	0.50	....	1.70	2.20
28.	New Hope Landing	...	2.70	....	2.70
29.	Hildreth lane	...	....	0.90	0.90
30.	Davis and Telegraph	...	....	4.88	4.88
31.	Jack Tone	13.47	....	....	13.47
32.	Peters	4.97	....	....	4.97
33.	Sharp's lane	3.59	....	....	3.59
34.	Moss avenue	0.78	....	....	0.78
35.	Garwood Ferry	...	....	1.66	1.66
36.	Harshner lane	...	1.25	....	1.25
37.	Davis	...	....	1.50	1.50
38.	Pine street	...	....	1.21	1.21
39.	Kettleman lane	...	....	1.61	1.61
40.	West lane	2.88	....	0.78	3.66
41.	Upper Sacramento	7.95	....	....	7.95
42.	Murphy Ferry	3.89	....	....	3.89
43.	Weber	2.51	....	....	2.51
44.	Pock lane	0.94	....	....	0.94
45.	Main street, Ripon	...	....	0.36	0.36
46.	Perrott	...	....	1.50	1.50
47.	Country Club	2.92	....	....	2.92
48.	Fairchild	1.75	....	....	1.75
49.	North Oaks streets	...	....	0.67	0.67
50.	Brookside	2.20	....	....	2.20
		63.48	16.18	16.77	96.43

Fig. 1 shows the highways in charge of the county maintenance department. The county has an area of about 1300 square miles, all level agricultural land, except in the extreme south-western part. The population of the county in 1910 was 50,731, of Stockton, 23,253, of Lodi, 2697, and of Tracy, 800. These figures have

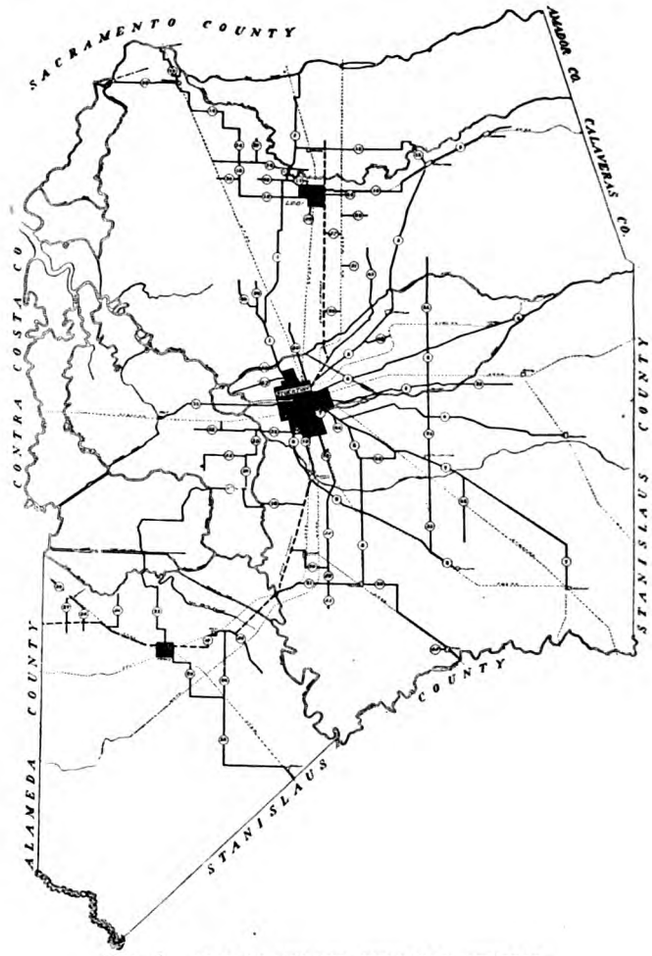


FIG. 1. MAP OF COUNTY HIGHWAY SYSTEM.

probably increased considerably at the present time. The other towns in the county are small. Stockton is the head of navigation on the San Joaquin river and is also a manufacturing centre. In the 'delta country' west of Stockton, the various river-channels carry a large traffic and take the place of highways to a considerable extent.

The semi-annual report of the highway maintenance department, from which the tables and map included with this article have been taken, show the following maintenance costs of the roads constructed under the bond issue during the past three years.

The extraordinary maintenance work during 1916 comprised the following: Constructing oil-macadam shoulders, 3 ft. wide on the west side of the existing pavement on the Lower Sacramento highway, north from the Moke-

Generated on 2024-09-30 01:24 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

TABLE I

DECEMBER 31, 1916

No.	Roads	Oiled macadam	Asphalt macadam	Asphalt	Gravel	Bitucrete	Total
1.	Lower Sacramento	....	19.94	....	....	....	19.94
3.	Waterloo	20.66	....	....	....	....	20.66
4.	Linden	11.59	....	....	1.80	....	13.39
5.	Copperopolis	7.88	....	....	....	....	7.88
6.	Farmington	13.19	....	....	....	0.62	13.81
7.	Mariposa	17.75	1.76	....	....	....	19.51
8.	Hogan	4.32	....	....	5.32	....	9.64
9.	French Camp	13.16	....	....	....	....	13.16
10.	Roberts Island	8.96	....	....	....	....	8.96
11.	Jacobs	3.55	....	....	3.25	....	6.80
12.	North Stockton	....	....	0.43	....	....	0.43
14.	New Hope	14.33	....	....	....	....	14.33
15.	Acampo-Lockeford	8.71	....	....	....	....	8.71
16.	Lodi-Lockeford	6.69	....	....	....	....	6.69
17.	Lodi-Woodbridge	1.67	....	....	....	....	1.67
18.	Lodi-Lafayette	6.08	....	....	....	....	6.08
19.	West Side	2.65	....	....	....	....	2.65
20.	Lathrop	3.99	....	....	....	....	3.99
21.	Mossdale Bridge-Manteca	4.80	....	....	....	....	4.80
22.	Manteca-Ripon	8.28	....	....	....	....	8.28
23.	Tracy-Vernalis	1.00	....	....	13.49	....	14.49
	Totals	159.26	21.70	0.43	23.86	0.62	205.87

lumne river for 3.15 miles and 4 ft. wide for 1.40 miles farther at a total cost of $9884.78. Scarifying, reshaping, and resurfacing the Acampo-Lockford highway from the Lower Sacramento highway east 0.75 mile to the Southern Pacific track at a cost of $1811.07. Scarifying, removing excess of fine sand and screenings incorporated in oil, reshaping, and resurfacing Linden highway from the diverting canal easterly 3 miles at a cost of $4230.62. Scarifying, reshaping, and resurfacing Farmington highway for 1.85 miles at a cost of $2386.65. Scarifying, reshaping, and resurfacing 0.75 mile of Mariposa highway at a cost of $1576.13. This indicates a cost of from $1300 to $2400 per mile for scarifying, reshaping, and resurfacing an oil-macadam highway. Probably the lower figures are for the narrower roads.

The cost of maintenance of the highways in charge of the maintenance department, but not constructed from the bond issue is shown in Table IV.

The following extraordinary maintenance charges on these roads are given: Scarifying, removing top course of

TABLE III

		Average cost per mile					
		1914		1915		1916	
		Ordinary maintenance	Extraordinary maintenance	Ordinary maintenance	Extraordinary maintenance	Ordinary maintenance	Extraordinary maintenance
1.	Lower Sacramento	$ 91.94	$563.61	$125.66	$217.48	$111.54	$495.73
2.	Cherokee lane	268.10	192.33	144.66	90.75	.....	.....
3.	Waterloo	171.49	134.19	176.67	199.70	142.18	.....
4.	Linden	197.21	.....	214.58	.....	130.94	315.95
5.	Copperopolis	94.57	.....	102.91	.....	39.34	.....
6.	Farmington	184.41	.....	140.29	.....	206.04	172.77
7.	Mariposa	222.65	.....	183.99	.....	127.82	80.79
8.	Hogan	282.23	.....	319.35	110.38	236.00	.....
9.	French Camp	286.70	.....	166.03	194.31	137.75	.....
10.	Roberts Island	189.60	.....	192.84	.....	122.30	.....
11.	Jacobs	164.83	205.69	329.82	83.07	218.91	.....
12.	North Stockton	44.86	.....	70.00	.....	35.70	.....
13.	Homestead	182.94	.....	.....	.....	.....	.....
14.	New Hope	153.35	.....	173.78	.....	110.77	.....
15.	Acampo-Lockeford	170.36	395.82	238.63	457.26	50.70	207.93
16.	Lodi-Lockeford	106.56	.....	145.70	.....	57.84	.....
17.	Lodi-Woodbridge	169.99	.....	239.19	.....	99.28	.....
18.	Lodi-Lafayette	115.41	.....	202.48	.....	60.99	.....
19.	West Side	256.73	.....	176.21	.....	122.04	.....
20.	Lathrop	171.38	.....	136.64	.....	126.79	.....
21.	Mossdale Bridge-Manteca	162.96	.....	372.00	.....	178.29	.....
22.	Manteca-Ripon	130.90	.....	193.44	.....	224.13	.....
23.	Tracy-Vernalis	53.78	.....	169.84	.....	125.84	.....

Generated on 2024-09-30 01:24 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

TABLE IV

No.	Roads	Mileage under supervision Jan. 1, 1916 to July 1, 1916	Average cost per mile Jan. 1, 1916 to July 1, 1916	Mileage under supervision July 1, 1916 to Jan. 1, 1917	Average cost per mile July 1, 1916 to Jan. 1, 1917	Average cost per mile Jan. 1, 1916 to Jan. 1, 1917
13.	McKinley avenue	3.63	$123.17	3.63	$196.57	$319.74
24.	Bird	4.00	66.18	4.00	94.44	160.62
25.	Howard	15.73	189.64	15.73	77.51	267.15
26.	Bethany-Lammersville	4.00	49.75	4.00	107.57	157.32
27.	Bethany	2.20	23.13	2.20	273.11	296.24
28.	New Hope Landing	2.70	37.79	3.63	6.21	44.00
29.	Hildreth lane	0.90	297.91	0.90	3.20	301.11
30.	Davis and Telegraph	4.88	51.32	4.88	183.69	235.01
31.	Jack Tone	13.47	98.06	13.47	59.14	157.20
32.	Peters	4.97	69.81	4.97	34.44	104.25
33.	Sharp's lane	3.59	74.90	3.59	455.79	530.69
34.	Moss avenue	0.78	85.21	0.78	3.62	88.83
35.	Garwood Ferry	1.66	163.15	1.66	378.40	541.55
36.	Harshner lane	1.25	47.42	1.25	21.29	68.71
37.	Davis	1.50	21.16	1.50	441.28	462.44
38.	Pine street	1.21	75.93	1.21	12.45	88.38
39.	Kettleman lane	1.61	66.11	1.61	5.38	71.49
40.	West lane	3.66	121.05	3.66	347.60	468.65
41.	Upper Sacramento	7.95	119.46	7.95	28.16	147.62
42.	Murphy Ferry	3.89	42.65	3.89	33.52	76.17
43.	Weber	2.51	97.53	2.51	57.33	154.86
44.	Pock lane	0.94	149.67	0.94	20.66	170.33
45.	Main street, Ripon	...	.....	0.36	175.33	175.33
46.	Perrott	...	.....	1.50	361.25	361.25
47.	Country Club	...	.....	2.92	489.63	489.63
48.	Fairchild lane	...	.....	1.75	114.93	114.93
49.	North Oaks streets	...	.....	0.67	4.40	4.40
50.	Brookside	...	.....	2.20	11.15	11.15
	Total	87.03		96.43		

rock, adding 2 in. of gravel to base, replacing wearing course and re-surfacing 0.24 mile of West lane at a cost of $690.82. Scarifying, reshaping, and rolling 2.70 miles of Sharp's lane at a cost of $1277.29.

The report mentions that while it has been the intention to convert the water-bound macadam and gravel roads into oil-macadam roads, lack of funds for permanent construction has interfered with this intention, although the cost of maintenance of the water-bound roads is large. It is also noted that Ford trucks have been substituted for horses and wagons for the use of patrolmen.

STANDARD WIDTHS FOR WAGON TIRES

As the result of a series of traction-tests on earth and gravel roads, the U. S. Department of Agriculture recommends that the following widths of tire be adopted generally by manufacturers for wagons of different carrying-capacities.

Type of wagon	Gross weight, loaded, lb.	Width of tire, in.
One-horse wagon	2000	2
Light two-horse wagon	3500	2½
Medium two-horse wagon	4500	3
Standard two-horse wagon	6800	4
Heavy two-horse wagon	7500	5

IRRIGATION BY MEANS OF CANVAS TUBE

By E. B. HOUSE*

*Colorado Agricultural College, Fort Collins, Colorado.

An interesting contrivance was tried last summer at the College farm. It consists of a canvas tube in which are placed small brass gates, so placed that each gate will come opposite a row down which it is desired to discharge irrigation water. The tube is laid along the high part of the field, connected with the ditch at the upper end, and the water runs through the tube. The water is discharged through the gate-openings in the amount desired by the irrigator. The supply for each tube is controlled by the gates. The size of the tube decreases as the distance from the ditch increases, so that the smaller head of water flowing at the lower end is carried through a smaller tube.

So far as the control of irrigation water is concerned this device is ideal. Furthermore, it is easily changed from place to place by allowing the water to run out of it and then dragging it along the ground. It should, however, be thoroughly cleaned when irrigation ceases, because the canvas will in time rot. The same care must be given a tube of this kind as is given to the ordinary canvas dam.—*Irrigation Age.*

The torque required for an electric starter to overcome the standing friction, or the break-away torque, is about four times that necessary to keep the engine turning, or the spinning torque.—*The Gas Engine.*

Generated on 2024-09-30 01:25 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Control of Vegetation in Irrigation Canals

A recent number of the *Reclamation Record* contains a summary of experience in combatting the growth of vegetation in irrigation canals by three engineers of the U. S. Reclamation Service. A. J. Haltom, irrigation manager for the Salt River project, Arizona, states the following conclusions regarding moss:

1. Moss does not grow in canals of high velocity, neither does it flourish in canals that have uniform grades, but canals of uneven grades which contain low spots are very favorable for healthy growth.

2. Moss does not grow in the absence of sunlight.

3. It does not grow in canals with water depth of more than 5 feet.

4. It flourishes best in canals with a silt bottom, because the silt furnishes an excellent medium for root development.

5. It obtains its healthiest growth in clear water. Muddy water retards but does not completely stop its growth.

Since the demand for water by the farmers prevented turning the water out of the canals long enough to kill the moss, several devices were tried for cutting the moss. These included chains, dump-rakes, spike-tooth harrows, disk-harrows, mowing-machines, submarine saws, and an Acme harrow or orchard cultivator. The best results were obtained with the Acme harrow, which is a machine consisting of long parallel blades, attached to an iron frame, with the blades turned to enter the ground and cut the roots horizontally an inch or two below the surface. It slices off the top surface of the silt. After the moss-roots are cut, the moss floats to the surface of the water, and is caught by men stationed downstream on bridges or checks. The harrow is drawn by a chain attached to a team on each bank of the canal. By adjusting the length of the chains, the harrow can be run on either slope or in the bottom of the canal. In this way the moss can be removed without interrupting the flow of the water.

On some of the canals it was necessary to keep men and teams continuously employed, while on others, cleaning every two or three weeks was sufficient. This kind of harrow is also useful in stirring the silt on the bottom of the canal, causing it to be carried in suspension, with the result that silt-deposits within the canal-prism are diminished. The stirring of the silt with the resulting muddy water retards the growth of moss downstream. It also helps to puddle leaky parts of the canal.

On the Minidoka project in Idaho, Barry Dibble and T. W. Parry found that the moss in general had similar characteristics to those noted on the Salt River project. The growth commences as soon as the water gets warm in the spring, and the plants mature in August.

The Ziemsen submarine saw was the most effective device for use in the larger canals. This saw consists of a flexible band of steel with hooked teeth on both edges. It can be obtained in any length. The weights to hold it to the bottom are adjusted to fit the canal. It is operated at an angle of about 30° with the cross-section of the canal, the crew always working upstream. The rate of progress is from 6 to 12 in. at each double stroke. From ¼ to 1 mile per day can be cut with each saw. At times it has been necessary to have as many as three men to pitch out the moss cut by one crew. It has been found necessary to go over many of the canals three times.

By the latter part of August, when the moss had ripened sufficiently to break off at the first joint, dragging a ½ or ¾-in. chain by teams on each bank became effective. Before this time the chain would drag over the moss without breaking it. In the shallow laterals a spring-tooth harrow was found to be effective, but this method was not successful in the larger canals. Men with brush-scythes were also employed on the small ditches, particularly where the farmers along the ditch could be induced to co-operate with the project manager in this way. As on the Salt River project, turning the water out of the canals was not practicable.

The average cost per mile of the different methods was as follows: sawing, $22; chaining late in the season, $8; cutting with scythes in laterals, $11; spring-tooth harrow in laterals, $9.

Weeds and grass growing along the inner slopes of the canals were removed by men with brush-scythes. The average cost was $12 per mile. Large willows can be cut with grubbing-hoes and small willows with brush-scythes. The average cost was $27 per mile. New growth of willows can often be cut with a mowing-machine. Grazing the banks by bands of sheep keeps down the growth of willows and weeds, and also decreases trouble from musk-rats and gophers. Sheep should, however, not be allowed where the banks are of sand that would blow away if loosened.

Shale in the Green River formation in north-western Colorado should yield 20,000,000,000 bbl. of petroleum and 300,000,000 tons of ammonium sulphate. About as much more can be obtained from the shale in north-eastern Utah. Most of this shale will produce from 1 to 2 bbl. of oil per ton.

High-speed steel can be distinguished from common tool-steel by touching it to an emery-wheel. Common tool-steel gives a yellow spark, while the spark from high-speed is blood-red, much like the spark that is obtained when grinding cast-iron.—*The Gas Engine.*

Generated on 2024-09-30 01:26 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Statistics of Oil Companies and Wells in the California Fields

The first annual report of the California State Oil and Gas Supervisor, for the year ended June 30, 1916, published as bulletin No. 73, of the State Mining Bureau, contains a list of over 800 oil companies, about 300 of which are producing. A number of the non-producing companies own land that is leased to some producing concern. A list of the companies operating twenty or more wells appears below. It should be remembered that number of wells is not necessarily an indication of relative production, in fact, several companies having less than twenty wells are probably of more importance than some of those given on the list. The Chanslor-Canfield Midway Oil Co. and the Petroleum Development Co. are controlled by the Atchison, Topeka & Santa Fe Railroad. The Southern Pacific Co. controls the Kern Trading & Oil Co., and holds 51% of the stock in the Associated Oil Co. The same interests control the Amalgamated Oil Co., Arcturus

Name of company	Kern county	Orange county	Los Angeles county	Santa Barbara county	Ventura county	Fresno county
Alma Oil Co	20	...	...	...	...	...
Amalgamated Oil Co	...	17	6	...	...	...
American Oilfields Co	46	...	...	...	...	...
American Petroleum Co	...	...	...	...	...	84
Arcturus Oil Co	...	...	31	...	...	...
Associated Oil Co	524	...	...	...	...	47
Bankers Oil Co	32	...	...	...	...	...
Bard Oil & Asphalt Co	...	...	...	...	22	...
Belridge Oil Co	73	...	...	...	...	...
Brea Canyon Oil Co	...	24	...	...	...	...
Buena Fe Petroleum Co	53	...	...	...	...	...
Caribou Oil Mining Co	3	...	...	...	...	23
Central Oil Co	...	...	55	...	...	...
Chanslor-Canfields Midway Oil Co	106	...	...	...	...	...
Claremont Oil Co	14	...	...	...	...	14
Columbia Oil Producing Co	...	59	49	...	...	...
East Puente Oil Co	21	...	...	...	...	...
General Petroleum Co	168	37	...	...	...	13
A. F. Gilmore Oil Co	...	...	20	...	...	...
J. E. Gray Estate	24	...	...	...	...	...
Honolulu Consolidated Oil Co	35	...	...	...	...	...
Inca Oil Co	...	...	...	...	...	36
Kern River Oil Fields of California, Ltd	241	...	...	...	...	...
Kern Trading & Oil Co	389	...	...	...	...	122
Knob Hill Oil Co	30	...	...	...	...	...
Mascot Oil Co	37	...	...	...	...	...
M. J. & M. M. Consolidated	23	...	...	...	...	...
Montebello Oil Co	...	...	...	...	74	...
Monte Cristo Oil & Development Co	88	...	7	...	...	...
Newlove Oil Co	...	...	...	36	...	...
North American Oil Consolidated	64	...	...	...	...	...
Ojai Valley Petroleum Co	20	...	...	...	...	...
Pacific Light & Power Co	...	...	40	...	...	...
Petroleum Development Co	108	68	...	...	...	...
Pinal Dome Oil Co	9	...	...	42	...	...
Rancho La Brea Oil Co	...	...	57	...	...	...
Reward Oil Co	40	...	...	...	...	...
Salt Lake Oil Co	...	...	109	...	...	...
Section 25 Oil Co	30	...	...	...	...	...
Shell Co. of California	...	...	...	...	...	83
Standard Oil Co	260	33	102	...	...	85
State Consolidated Oil Co	27	...	...	...	...	...
Sterling Oil & Development Co	41	...	...	...	...	...
St. Helens Petroleum Co	12	14	...	...	...	...
Sunset Monarch Oil Co	33	...	...	...	...	...
Traders Oil Co	25	...	...	...	...	25
Union Oil Co	18	61	...	116	88	18
Universal Oil Co	46	...	...	...	...	...
West Coast Oil Co	...	46	16	...	...	...
Western Union Oil Co	...	...	...	39	...	...

Generated on 2024-09-30 01:23 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Oil Co., Salt Lake Oil Co., and West Coast Oil Co. The Standard Oil Co. has now acquired control of the M. J. & M. M. Consolidated, Monte Cristo Oil Co., and Sunset Monarch Oil Co., with 144 wells in Kern county and 7 in Los Angeles county. The American Oilfields Co. and the American Petroleum Co. are controlled by the same interests. In the entire State there are nearly 7000 producing wells.

Statistics of Oil Production in California

The accompanying table, taken from the *Standard Oil Bulletin*, shows the production of oil from the different fields in California up to December 31, 1916. The star indicates the year the first well was drilled.

Year	Kern River	McKittrick	Midway	Sunset	Coalinga	Santa Maria-Lompoc	Summerland	Newhall and Ventura Co.	Los Angeles and Salt Lake	Whittier-Fullerton	Lost Hills-Belridge	Miscellaneous	Total
Prior								175,000					175,000
1876								12,000					12,000
77								13,000					13,000
78								15,227					15,227
79								19,858					19,858
1880								40,552					40,552
81								99,862					99,862
82								128,636					128,636
83								142,857					142,857
84								262,000					262,000
85								325,000					325,000
86								377,145					377,145
87								678,572					678,572
88								690,333					690,333
89								303,220					303,220
1890					★		★	307,360					307,360
91				★				323,600					323,600
92		★						385,049					385,049
93								470,179					470,179
94							1,500	524,469	257,109				783,078
95							16,904	476,490	751,945				1,245,339
96					14,119		39,792	298,866	905,003				1,257,780
97					70,140		130,136	368,282	1,327,011	12,000		4,000	1,911,569
98		10,000			154,000		132,217	427,000	1,462,871	60,000		3,000	2,249,088
99	★	15,000			439,372		208,370	496,200	1,409,356	108,077		1,500	2,677,875
1900	826,775	80,000	★	12,500	547,960		183,486	443,000	1,722,887	254,397		248,945	4,319,950
01	3,278,840	430,450	4,235	188,600	525,433	★	203,616	472,057	2,304,432	302,652			7,710,315
02	8,988,046	619,296	3,048	167,558	571,233	86,888	143,552	475,000	2,198,496	1,103,793			14,356,910
03	16,342,099	1,353,206	27,305	352,565	2,138,058	204,890	131,125	682,185	793,765	2,305,613		3,670	24,334,481
04	17,226,240	1,856,225	910	390,425	5,097,853	700,450	120,506	650,779	1,241,304	2,224,550		39,392	29,548,634
05	15,253,845	1,373,030	18,530	419,212	8,882,125	3,402,800	96,871	476,898	2,226,768	2,118,312		29,650	34,298,041
06	12,825,166	680,756	11,800	307,550	8,401,105	4,799,411	72,810	404,379	2,675,650	2,434,512		10,090	32,623,229
07	12,346,014	2,415,840	149,944	704,805	8,996,268	8,249,236	69,060	435,584	3,372,465	3,294,206		69,090	40,102,512
08	13,803,579	3,076,300	434,578	1,463,510	10,725,795	8,699,350	67,862	498,015	5,138,959	4,273,314		125,475	48,306,737
09	14,508,242	5,807,360	2,234,455	1,999,701	15,406,619	8,017,455	66,338	516,628	4,350,898	5,157,252		126,775	58,191,723
1910	14,776,435	5,471,613	11,174,207	9,218,904	18,646,570	7,607,830	74,725	652,575	3,729,618	6,281,221	4,900	58,970	77,697,568
11	14,078,890	5,477,332	21,584,602	5,559,069	18,311,251	7,465,074	71,255	661,785	3,223,661	7,081,165	168,410	61,350	83,744,044
12	12,446,445	5,094,465	25,948,980	5,590,824	19,546,122	6,801,966	65,715	859,885	3,073,427	7,919,779	2,680,961	45,870	90,074,439
13	9,980,940	4,496,842	33,040,129	5,984,651	18,604,626	5,817,711	62,406	1,022,052	2,898,846	10,657,053	5,274,553	27,375	97,867,184
14	7,030,545	3,820,857	37,479,228	12,546,615	15,925,887	4,303,080	55,743	968,421	2,504,475	14,130,548	4,830,921	27,375	103,623,695
15	8,034,974	3,552,801	33,311,486	6,006,607	13,548,159	4,536,840	53,000	1,036,305	2,110,133	13,030,549	4,318,550	27,375	89,566,779
16	8,402,525	3,230,644	32,156,818	6,768,658	14,381,493	4,422,410	56,775	1,122,033	1,721,453	14,679,672	4,852,431	27,450	91,822,362
Total.	190,149,600	48,862,217	197,580,255	57,681,754	180,934,188	75,115,391	2,123,764	18,738,338	51,400,532	97,428,665	22,130,726	937,352	943,082,782

A COMBINED CULVERT, SIDEWALK, AND CURB

The construction of a combined culvert, sidewalk, and curb at Ann Arbor, Michigan, is described in *The American City*, by Manley Osgood, city engineer. The slope and other conditions were such that no great depth of excavation was required. The grade of the invert of the culvert was uniform, but the grade of the sidewalk varied. The invert and the side-walls were 6 in. thick and made of plain concrete. The sidewalk was a 6-in. reinforced concrete slab. On the street-side the slab was finished with a curbing-face. The top one-inch of the slab was made of 1:2 mortar.

The total length of the culvert was 1350 ft., most of it in stiff clay which could be cut vertically. Wooden forms were used for the inside of the structure. Where the bank caved, wooden outside-forms were also used. A gang of eight or ten men was employed on the work and the costs were as follows:

1640 cu. yd. excavation, at $0.65	$1066.00
9646.4 sq. ft. reinforcement, at $0.02	192.93
540.6 cu. yd. of concrete, at $8.45	4568.07
110.5 lin. ft. of 12-in. pipe, at $0.33	36.47
3 tees, 12-in., at $1	3.00
5 elbows, 12-in., at $1	5.00
7 iron box inlets, at $12	84.00
8 cast-iron covers, at $5.50	44.00
Minor extras	51.63
Total	$6051.10

A rubber belt was used for finishing concrete roads in Utah between Logan and Kaysville. The belt was used with a saw-like motion after the surface had been struck off with a template and the concrete had been given a short time to stiffen. Canvas and leather belts were used at first but the rubber belt was found more satisfactory. A canvas belt was also used to finish a city street in Ogden, Utah. The pavement was 49 ft. wide. The belt was 51 ft. long and 12 in. wide, and was supported at intervals by brackets from the bridge.

The average earnings for the United States per passenger train-mile from all sources are $1.40. The average weight of such a train is 550 tons.

Generated on 2024-09-30 01:24 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Railroad Grade-Crossings in California

A progress report has recently been issued by the California State Railroad Commission on its investigation of grade-crossings in California. This investigation was commenced about a year ago. Several hearings were in different parts of the State, which were attended by representatives of political bodies and the railroads, and other interested persons. Field work was then started, a representative of the Commission visiting each grade-crossing, whenever possible in company with representatives of the city or county government and of the railroads interested. It is expected that about one year more will be required to complete the field-work. The present report covers the work up to January 1, 1917.

Of the 10,000 grade-crossings in California at the present time, the Commission has investigated about 2000. These include the following: all of Ventura county, the unincorporated territory in Los Angeles county, all municipalities on the Salt Lake Route and most of those on the Santa Fe and Pacific Electric Railway in Los Angeles county, all of Northwestern Pacific Railroad south of Willits and in city of Eureka, nearly all in Stanislaus, Madera, and Merced counties on Southern Pacific lines, nearly all of Marin and Sonoma counties, most of Alameda county on Southern Pacific and Western Pacific lines, and scattering crossings in other parts of the State.

The Commission has made 1100 recommendations, divided as follows:

Employ human flagmen	4
Use automatic flagmen or bells	66
Use gates	4
Place, remove, or change position of signs	449
Cut brush or trees or trim trees	319
Remove buildings, billboards, and other obstructions	30
Grade approaches	27
Change alignment of road	4
Grade between rails	14
Change grade of track	1
Close crossings	92
Separate grades	18
Change position of crossing	1
Change to private crossing	7
Operate trains at slow speed	2
Other minor recommendations	62
Total	1,100

Of these recommendations 10% have already been carried out, and assurances have been given by those in authority that 70% of the remainder will be acted upon as soon as possible.

The most important of these recommendations are those for closing streets and for separation of grades. Several of the 92 crossings ordered closed, cannot be closed until adjacent highways are constructed or relocated. No action has been taken on any of the 27 recommendations for grade-separation. In a few cases, plans for separation are under consideration.

At the present time the average number of persons killed in grade-crossing accidents per month is 9, and the average number injured is 27. However, the figures for the last six months of 1916 are somewhat smaller than those for the corresponding months of 1915. It is probable that this may be attributed in part to the recommendations of the Commission, but the period is too short and the improvement too slight to make it possible to draw any definite conclusions. Since traffic on both railroads and highways is increasing steadily, it is hardly likely that there will be a numerical decrease in grade-crossing accidents, but a proportional decrease is probable.

Among protective devices, the automatic flagman appears to be the most efficient. If automobile traffic alone were to be considered, the proper place for automatic flagmen, as well as other warning-signals, would be in the centre of the roadway. Since most horse-drawn vehicles are inadequately provided with lights, there would be danger of collision with such signs, unless they were lighted at night.

A committee appointed by the National Association of Railway Commissioners and the American Railway Association has recommended a standard warning-signal to be placed on the highway not less than 300 ft. from the crossing on each side of the tracks, the sign to be a circular disk not less than 24 in. diam., painted white, with a black border and black cross-lines, with the letters 'R.R.' Where necessary this warning-sign is to be lighted at night.

Protection of crossings by obstacles that will compel slow speed has also been considered by the Commission, and several plans for obstacles are given in the report. Probably the most effective type, combining obstacles and warning-signs is one suggested by M. M. O'Shaughnessy, city engineer of San Francisco. In this plan, the profile of the road is broken slightly 400 ft. from the crossing, 25 ft. from this point there is a warning-sign on the right-hand side of the road, 50 ft. from the crossing there is an automatic flagman placed in the centre of the road and protected by a guard-fence, the road being widened. Just beyond the fence there is an accentuated break in the road-profile. This plan seems to be the most effective one for crossing-protection by purely mechanical means.

Volcanic cinders are being used for concrete aggregate in the construction of a dam on the Klamath river for the California-Oregon Power Co. The weight of the cinders is 105 lb. per cu. ft., but so many heavy 'plums' are used with the concrete that the average weight of the entire mass is 155 lb. per cubic foot.

Generated on 2024-09-30 01:24 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Industrial Progress

NEW TYPE OF OUTDOOR LIGHTING-UNIT

A common type of street lighting-unit is illustrated at the right in Fig. 1. A large part of the rays are thrown upward

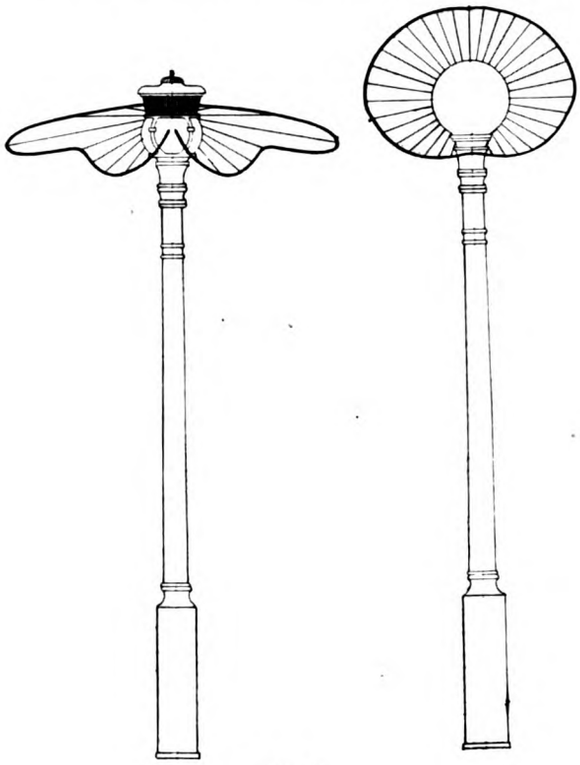


FIG. 1.

and lost. The General Electric Co. has recently perfected a lighting-unit illustrated at the left in Fig. 1, where the rays are reflected downward, where they will do the most good.

FIG. 2.

The same kind of unit, but of the pendant type is shown in Fig. 2. This kind of lighting unit is suitable for lighting streets, and also large open spaces such as docks, lumber and railroad yards, platforms at railroad stations, and yards of industrial plants.

SHARPENER FOR SMALL-SIZE DRILL-STEEL

In has been conclusively demonstrated that both time of drilling and wear and tear on equipment is reduced considerably by the use of a machine for sharpening the drill-steel. The standard type of sharpener, however, is too expensive for the user of only a few drills. The Ingersoll-Rand Co. has perfected the Leyner Jacksteel sharpener for this class of users.

LEYNER JACKSTEEL SHARPENER.

This sharpener will handle drill-steel up to the following maximum steel sizes, 1⅛-in. diam. round, cruciform, and light-section twisted or banded, 1-in. diam. hexagon or octagon, and ⅞-in. square, and the following bit sizes: 1¼-in. Carr bits or bits of other than 14° taper, and 2-in. standard 14° taper. The weight of the machine is 925 lb. No foundation is required other than a plank support 3½ ft. square. An unusual feature of the machine is the use of a single piston-rod on the clamping-piston, which allows the die and dollying-hammer to be placed directly under the eye of the operator.

THE ABSORPTION METHOD OF EXTRACTING GASOLINE FROM NATURAL GAS

The annual report of the State Oil and Gas Supervisor for California contains a description of the absorption method by B. E. Lindsly, engineer for the Honolulu Consolidated Oil Co. The method consists of subjecting gas to intimate contact with oil that is completely devoid of gasoline. The gasoline

Generated on 2024-09-30 01:28 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

vapors in the gas are deposited in the oil and subsequently recovered by distillation. The gravity of the oil should be about 34° Baumé, and the boiling-point sufficiently high to permit an easy separation from the absorbed gasoline. An initial boiling-point of 450° F. is satisfactory.

The cycle of the absorbing-oil is as follows: The oil enters the heat-exchanger, where it transmits heat to the incoming oil. Then it passes to a cooler, to a horizontal absorber, and to a vertical spray-absorber. The gas-pressure forces it to a separator where the pressure is released. The excess gas given off in the separator is collected. The oil passes to the exchanger and to the still, where the gas is extracted and the cycle is repeated.

It is claimed that the absorption method has the following advantages over the compressor method: greater recovery, lower first cost, and lower operating-cost. A recovery of at least 0.1 gal. per 1000 ft. of gas can usually be obtained from even so-called 'dry' gas, or gas that has already been treated by the compressor method. Engineers connected with the U. S. Bureau of Mines have estimated that the first cost of an absorption plant with a capacity of 60,000,000 cu. ft. of gas per day would be $1 to $1.50 per 1,000,000 ft. capacity. Doubling this maximum estimate for a small plant, the cost of a 2,000,000 cu. ft. plant would be only $6000. The output of such a plant, assuming a recovery of 0.25 gal. per 1000 cu. ft. would be 500 gal. of gasoline per day. The cost for labor would not be over $15 per day. Since the method is patented and controlled by the Hope Natural Gas Co. of Pittsburg, Pennsylvania, there would also be a royalty charge.

Engineers' Note Book

DIAGRAM FOR ESTIMATING EARTHWORK IN CANALS

By CHARLES K. FOX and CHARLES M. STOKES*

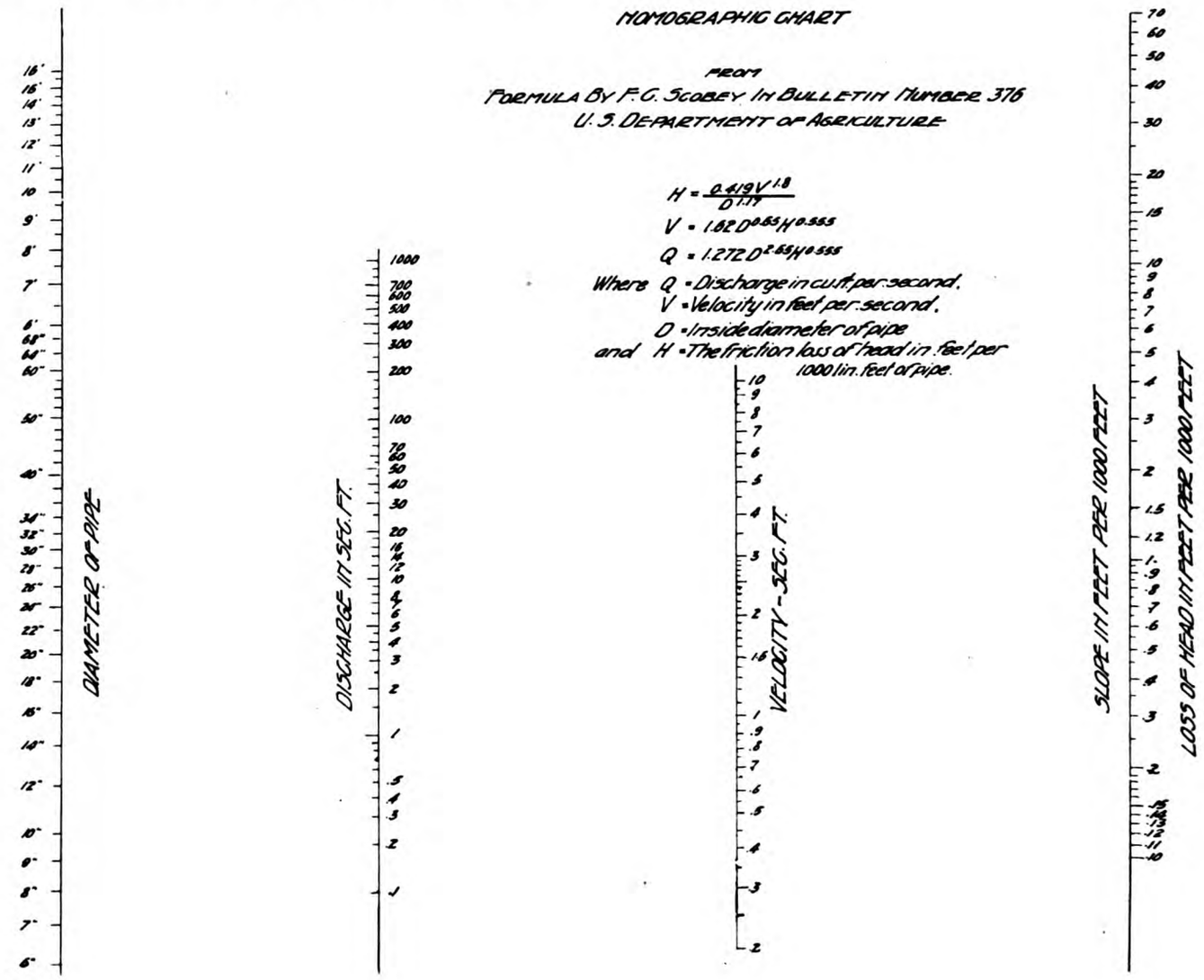
The diagram on page 197, for computing earthwork in canals is self-explanatory.

NOMOGRAPHIC CHART FOR COMPUTING FLOW IN WOOD-STAVE PIPE

By CARL MAUGHMER*

The accompanying chart has been prepared for computing the discharge of wood-stave pipe according to the formula and chart of F. C. Scobey, given in Bulletin No. 376 of the U. S. Department of Agriculture, and also on page 18 of the January number of WESTERN ENGINEERING. By laying a straight-edge connecting any two quantities such as diameter and slope, the other two, such as discharge and velocity, may be determined. Thus for a 48-in. pipe and a slope of 3 ft. in 1000, the velocity is found to be 7½ ft. per second, and the discharge is approximately 90 cu. ft. per second.

*Pomona, California.
†Sacramento, California.


NOMOGRAPHIC CHART
FROM
FORMULA BY F.C. SCOBEY IN BULLETIN NUMBER 376
U.S. DEPARTMENT OF AGRICULTURE
H = 0.4193 V^1.8 / D^1.17
V = 1.82 D^0.63 H^0.555
Q = 1.272 D^2.63 H^0.555
Where Q = Discharge in cu.ft. per second.
V = Velocity in feet per second.
D = Inside diameter of pipe
and H = The friction loss of head in feet per 1000 lin. feet of pipe.
DIAMETER OF PIPE
DISCHARGE IN SEC. FT.
VELOCITY - SEC. FT.
SLOPE IN FEET PER 1000 FEET
LOSS OF HEAD IN FEET PER 1000 FEET

Generated on 2024-09-30 01:27 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

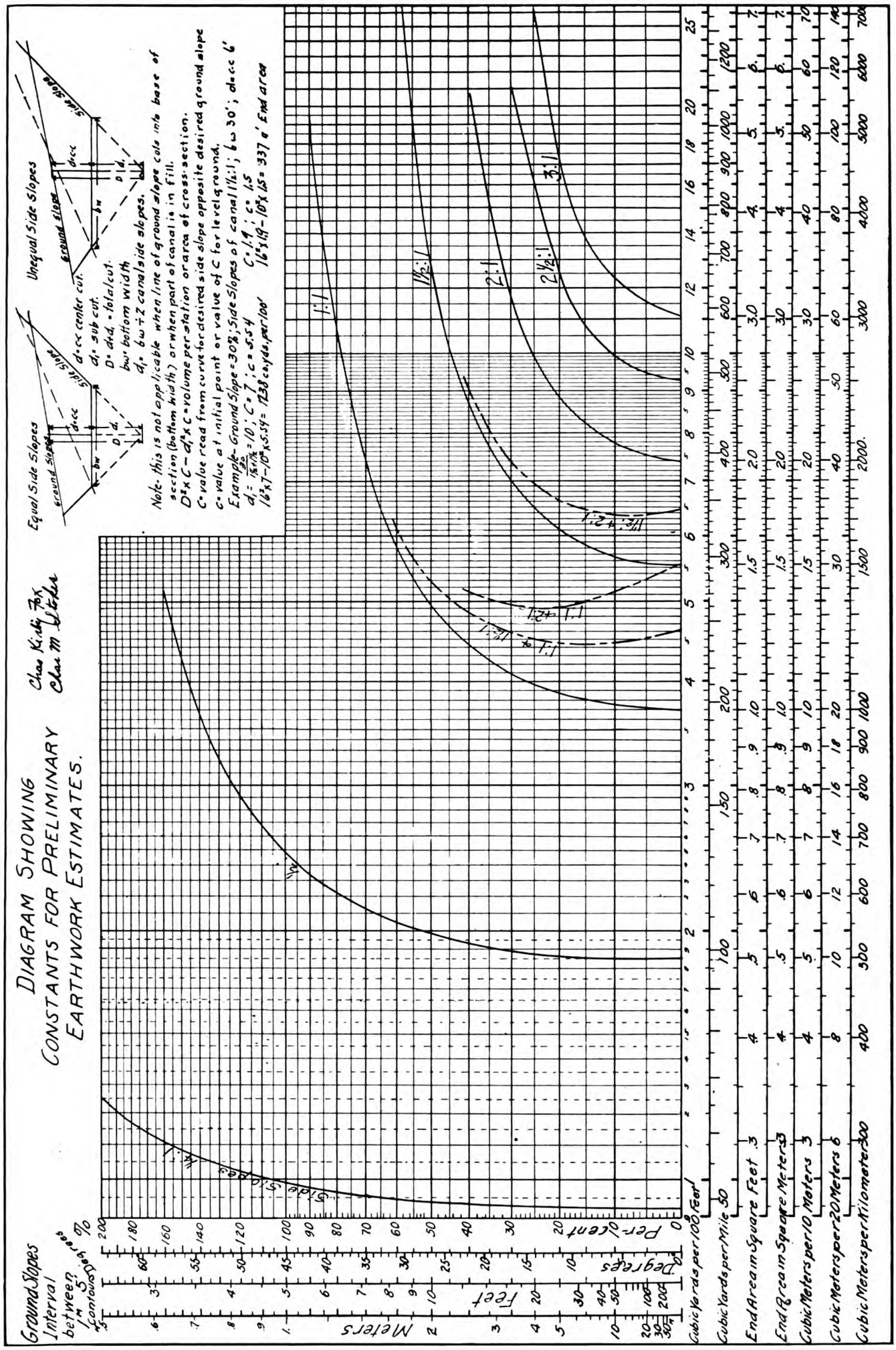


DIAGRAM SHOWING
CONSTANTS FOR PRELIMINARY
EARTHWORK ESTIMATES.
Chas Kirk Fox
Chas M Upton
Ground Slopes
Interval
between
5 feet
Contours
Meters
Feet
Degrees
Per-cent
Side Slopes
Cubic Yards per 100 Feet
Cubic Yards per Mile
End Areas in Square Feet
End Areas in Square Meters
Cubic Meters per 10 Meters
Cubic Meters per 20 Meters
Cubic Meters per 100 Meters
Equal Side Slopes
Unequal Side Slopes
Ground Slope
d = c+c center cut.
d1 = sub cut.
D = d+d1 = total cut.
bw = bottom width
d1 = bw ÷ 2 canalside slopes.
Note: this is not applicable when line of ground slope cuts into base of section (bottom width) or when part of canal is in fill.
D² x C – d1² x C = volume per station or area of cross-section.
C = value read from curve for desired side slope opposite desired ground slope
c = value at initial point or value of C for level ground.
Example: Ground Slope = 30%; Side Slopes of canal 1½:1; bw 30'; d = c+c 6'
d1 = 1½ x 6 = 10; C = 7; c = 5.54
16² x 7 – 10² x 5.54 = 1238 cu yds. per 100'
C = 1.9; c = 1.5
16² x 1.9 – 10² x 1.5 = 337 s' End area
1:1
1½:1
2:1
2½:1
3:1

Generated on 2024-09-30 01:26 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Book Reviews

CONCRETE, PLAIN AND REINFORCED. By Frederick W. Taylor and Sanford E. Thompson. Third edition. P. 868. Ill., index. John Wiley & Sons, Inc., New York. For sale by *Mining and Scientific Press*, San Francisco. Price, $5.

The third edition of this standard work has been thoroughly revised by the surviving author, the principal changes being in the chapters on reinforced concrete, which have been considerably enlarged, keeping pace with the advances made in the use of this material since the appearance of the second edition seven years ago. Besides the work of the principal authors, Spencer B. Newberry contributes a chapter on Chemistry of Hydraulic Cements, William B. Fuller writes of Proportioning Concrete, R. Feret discusses Effect of Sea-Water Upon Concrete and Mortar, and the chapter on Arches is written by Frank P. McKibben. The complete list of chapter-headings is as follows: Essential Elements, Elementary Outline of Concrete Processes, Specifications for Reinforced Concrete, Classification of Cements, Chemistry of Cements, Specifications and Tests for Cements, Tests of Aggregates, Voids, Strength and Composition of Cement Mortars, Proportioning Concrete, Tables of Quantities, Preparation of Materials, Mixing, Depositing, Effect of Sea-Water, Concrete in Freezing Weather, Destructive Agencies, Water-Tightness, Strength of Plain Concrete, Theory of Reinforced Concrete, Tests of Reinforced Concrete, Reinforced Concrete Design, Building Construction, Foundations and Piers, Beam Bridges, Arches, Dams, and Retaining Walls, Conduits and Tunnels, Reservoirs and Tanks, Concrete Pavement, Cement Manufacture, and Miscellaneous Structures. There is also a bibliography of books and important articles arranged according to the subdivision of the general subject. The book is well illustrated and there are many useful tables in the text. Engineers and concrete-contractors who do not possess a copy of one of the earlier editions will find an additional reason for obtaining this edition, while many of the others will want the additional matter contained in this edition.

THE MECHANICAL WORLD POCKET DIARY AND YEAR BOOK FOR 1917. P. 264. Ill., index. The Norman Remington Co., Baltimore. For sale by *Mining and Scientific Press*, San Francisco. Price, 35 cents.

This is the thirtieth annual issue of this useful pocket-book. The text has been revised in a number of places. The chapter on Steam and the Steam-Engine has been largely re-written. An entirely new chapter is devoted to the Heat Treatment of Steel. There are new tables on dimensions of flanged couplings, dimensions of piston-rings, and for the calculation of springs. While the book is primarily for the mechanical engineer, other engineers will also find it valuable. A diary for 1917 is included with the volume.

LUBRICATING ENGINEERS' HANDBOOK. By J. R. Battle. P. 333. Ill., plans, index. J. B. Lippincott Co, Philadelphia, 1916. For sale by *Mining and Scientific Press*, San Francisco. Price, $4.

We have perused this work on a very important subject with much interest, and consider it worth a place in every oil and mechanical engineer's library. To the contractor, the statement that "the most essential and yet the most neglected detail necessary to obtain the best results from pneumatic tools (drills, etc.) is proper and efficient lubrication," will be found apropos; also the remarks on lubrication of pumps and cars. In these times of high-speed engines, whether steam or oil-driven, lubrication is of paramount importance. Engines are not the only machinery to be considered, there being a thousand and one machines that require oil or grease at some part. Wherever two surfaces work against one another, friction and heat results, requiring a lubricant to reduce this as low as possible. The author terms this a "friction tax." Picking out several chapters of the book we find tersely given and practically illustrated, the theory of lubrication, petroleum and other lubricants and their manufacture, vegetal oils (under the caption 'vegetable oils'), tests of oils and grease, miscellaneous notes on oil, steam engines and turbines, bearings, lubricating apparatus, air-compressors, automobiles, Diesel engines, internal-combustion engines, locomotives, and the cost of lubrication. The index of 20 pages is well arranged.

FIELD GEOLOGY. By Frederick H. Lahee. P. 508. Ill., index. McGraw-Hill Book Co., Inc., New York, 1916. For sale by the *Mining and Scientific Press*, San Francisco. Price, $3.

The author presents an excellent treatise on geology which will be useful to students and engineers in the field, its size 7.5 by 5.25 in. with flexible morocco cover, making it convenient to carry in the pocket. It contains 409 half-tones and line-drawings, which so illustrate the text that even the young student can understand. In addition to the descriptive geology there is a chapter devoted to geologic surveying, in which many valuable suggestions are made to the young geologist and engineer in the field. Another chapter deals with the preparation of reports and geologic maps, and in the appendix are found tables for use in determining rocks; the solution of triangles, and a useful bibliography. In fact, it covers the field thoroughly, from the viewpoint of both the geologist and the engineer.

PRELIMINARY MATHEMATICS. By F. E. Austin. P. 210. Index. F. E. Austin, Hanover, N. H. For sale by *Mining and Scientific Press*, San Francisco. Price, $1.20.

The distinguishing feature of this book is the development of the use of algebraic symbols at the same time with the study of the ordinary arithmetical processes. The object is to avoid the difficulties of the transition from the use of figures to the use of letters. The book covers simple arithmetic, algebra as far as and including quadratic equations, and logarithms. Special emphasis is laid upon the practical application of the theories discussed. A curious error is the statement on page 9 that the meter is equal to 91.4 inches.

New Publications

REPORT OF THE COUNTY ENGINEER OF SNOHOMISH COUNTY, WASHINGTON. Pp. 30. Ill. Is devoted mainly to a description of the work now being done under the $1,800,000 bond issue for a county highway system.

FIRST ANNUAL REPORT OF THE CITY MANAGER, ALHAMBRA, CALIFORNIA. Pp. 73. Ill. The city manager, Charles E. Hewes, who was formerly city engineer, and now combines both these functions, presents a statement of the city's business in a businesslike way.

THE TRACTIVE RESISTANCE ON CURVES OF A 28-TON ELECTRIC CAR. By Edward C. Schmidt and Harold H. Dunn. Bulletin No. 92, Engineering Experiment Station, University of Illinois, Urbana. Pp. 51. Ill. Gives the result of a series of experiments made on curves ranging from 2° up to 14½°.

INVESTIGATIONS OF GRAVEL FOR ROAD SURFACING. By T. R. Agg. Bulletin No. 45, Engineering Experiment Station, Iowa State College, Ames. Pp. 32. Summary of results of the construction of several stretches of gravel road, some with and some without the addition of oil, together with cost data.

SIXTH BIENNIAL REPORT OF THE STATE ENGINEER OF OREGON. Pp. 165. Ill. This report is divided in two parts, Highways and Water Resources. Under Highways, the general plans for

Generated on 2024-09-30 01:25 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

State highways are discussed and a summary of the highway construction done under the direction of the State is given, together with cost data. Under Water Resources, a brief history of the irrigation districts in the State is given, also a summary of the work of the State Water Board in adjudicating water-rights.

BRIDGE MANUAL. Bulletin No. 3, State Highway Commission, Salem, Oregon. Pp. 154. Ill. While this book is intended mainly for the use of county officials having no technical training, it is a good practical treatise on the construction of ordinary highway bridges, and would be of value to any engineer interested in that class of work.

JOURNAL OF THE UTAH SOCIETY OF ENGINEERS. January 1917.

BULLETIN OF THE OREGON SOCIETY OF ENGINEERS. February 23, 1917.

OPERATING DETAILS OF GAS-PRODUCERS. By R. H. Fernald. Bulletin No. 109, U. S. Bureau of Mines, Washington, D. C. Pp. 72. Index. Devoted mainly to producers using coal or coke, but also contains some data regarding those using wood and petroleum.

POSSIBLE SOURCES OF WATER SUPPLY FOR THE CITY OF SACRAMENTO, CALIFORNIA. By Charles Gilman Hyde, George H. Wilhelm, and Frank C. Miller. Pp. 624. Ill., index. Published by the city of Sacramento.

REPORT ON THE PRICE OF GASOLINE IN 1915. Issued by the Federal Trade Commission. Pp. 224, with several insert charts and maps. The report places the blame for the whole trouble on the various branches of the Standard Oil Company.

MODERN METHODS IN CONCRETE CONSTRUCTION. The Hydrated Lime Bureau, National Lime Manufacturers Association, Pittsburg. Pp. 14. Ill. Describes several important structures where hydrated lime is used in making the concrete and gives the opinions of the engineers regarding this use.

THE BYRON OIL AND GAS FIELD. By Victor Ziegler. Pp. 27. Bulletin No. 14 of the office of the State geologist of Wyoming.

WHY BUILD FIREPROOF? Pp. 24. Integral Curb for Concrete Pavement. Pp. 12. The Portland Cement Association, Chicago.

THE GEOLOGICAL FORMATIONS OF CALIFORNIA. By James Perrin Smith. Pp. 41. The California State Mining Bureau, Ferry Bdg., San Francisco. This bulletin is published in conjunction with the geological map recently issued, but is also sold separately.

THE USE OF THE PANORAMIC CAMERA IN TOPOGRAPHIC SURVEYING. By James W. Bagley. Pp. 86. Ill., index. Bulletin No. 657, U. S. Geological Survey, Washington, D. C. Gives the theoretical foundation for this method of surveying and describes its practical application to considerable mapping recently done in Alaska

HOW YOU MAY SAVE MONEY IN OPERATING YOUR STEAM-BOILERS. The Coatesville Boiler Works, Coatesville, Pennsylvania. Pp. 47. Ill. Discusses scale-formation, combustion and proper firing, boiler-setting, and other subjects connected with power-plant economy. As far as possible, the language used is non-technical and the pamphlet should be of value to those interested in steam-boilers.

FIRST ANNUAL REPORT OF THE STATE OIL AND GAS SUPERVISOR OF CALIFORNIA. P. 274. Ill., index. Bulletin No. 73. California State Mining Bureau, Ferry building, San Francisco.

This report covers the period from the establishment of the oil and gas department of the Bureau August 9, 1915, to the close of the fiscal year ended June 30, 1916. The first chapter contains a general discussion of the water-infiltration problem and of the methods used by the Bureau in combating it. Then follow reports of the work in each field. The final chapter contains some notes on shutting off water, strength of casing, failure of derricks from wind-stresses, and extraction of gasoline from natural gas. Statistics of production are also given and there is a directory of oil companies, showing date of incorporation, capital stock, number of wells, and situation of properties. The report is a welcome addition to the small amount of literature upon the Californian fields.

Civil Service Examinations

Electrical Assistant, Signal Service, War Department. May 16. Salary $1200. Application form 1312. Usual places of examination.

Assistant Land Classifier, U. S. Geological Survey. May 16-17. Salary $1080 to $1620. Application form 1312. Usual places of examination.

Junior Laboratory Helper, Bureau of Standards. June 6. Salary $480 to $540. Application form 1312. Usual places of examination.

Junior Chemist. May 16-17. Salary $1200 to $1740. Application form 1312. Usual places of examination.

Architectural Assistant in Forest Products. May 16-17. Salary $1500. Application form 1312. Usual places of examination.

Landscape Architect. May 22. Salary $2400. Application form 1312. Usual places of examination.

Until further notice, applications for any of the following positions will be received at any time, and candidates will not be required to report for examination. Application form 1312: Ship draftsman, $3.28 to $6 per day. Sub-inspector of construction, $3.28 to $5.52 per day. Architectural draftsman, $3.04 to $8 per day. Mechanical engineer, $2200 to $3600. Chief draftsman, $2200. Superintendent, small-arms ammunition, $5000 to $6000. Assistant superintendent, small-arms ammunition, $2500 to $3000. Assistant superintendent, artillery ammunition, $2500 to $3000. Assistant superintendent, brass cartridge-cases, $2500. Superintendent of equipment, $2400 to $2800. Superintendent of inspection, $2500 to $4000. Chief inspector of fuses, $3000. Assistant inspector of engineering material, air-craft, $4.48 to $5.04 per day.

Engineering Societies

IDAHO SOCIETY OF ENGINEERS. Ira F. Schaffner, secretary, Boise.

Los Angeles Section of AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Ford W. Harris, secretary, 1029 Higgins building.

Los Angeles Section of AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Edward Woodbury, secretary, 255 East 3rd street.

OREGON SOCIETY OF ENGINEERS. Orrin E. Stanley, secretary, room 409, City Hall, Portland.

Portland Section, AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Paul Lebenbaum, secretary, 45 Union Depot.

Portland Association of Members of AMERICAN SOCIETY OF CIVIL ENGINEERS. J. A. Currey, secretary, 194 North 13th street, Portland.

San Francisco Association of Members of AMERICAN SOCIETY OF CIVIL ENGINEERS. E. T. Thurston, Jr., secretary, Mechanics Institute building.

San Francisco Section of AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Carl F. Braun, secretary, Hooker & Lent building.

San Francisco Section of AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. A. G. Jones, 811 Rialto building.

Southern California Association of Members of AMERICAN SOCIETY OF CIVIL ENGINEERS. Wilkie Woodard, secretary, 435 Consolidated Realty building, Los Angeles.

UTAH SOCIETY OF ENGINEERS. Hugh C. Lewis, secretary, Capitol building, Salt Lake City, Utah.

The OAKLAND, CALIFORNIA, ENGINEERS' CLUB was recently organized. Harlan D. Miller is president; R. S. Chew, vice-president; John A. Britton, Jr., secretary; and A. Vander Naillen, Jr., Romaine W. Meyers, and T. J. Allan, directors. The club expects to co-operate with the War Department in a census of the engineering resources of the community and also to assist the Oakland Chamber of Commerce in the solution of the engineering problems affecting the city.

Generated on 2024-09-30 01:23 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

On account of the War, the spring meeting of the PORTLAND CEMENT ASSOCIATION, which was to have been held at San Francisco during April has been postponed indefinitely.

The regular meeting of the IDAHO SOCIETY OF ENGINEERS was held at Boise on April 23. R. E. Shepperd of Jerome, addressed the society on 'Financing Engineering Projects.'

The regular meeting of the OREGON SOCIETY OF ENGINEERS was held at Portland, on April 28. O. Laurgaard and J. P. Newell discussed highway construction in Oregon and the proposed $6,000,000 bond issue for this purpose.

The regular meting of the UTAH SOCIETY OF ENGINEERS was held at Salt Lake City on April 18. W. C. Ebaugh addressed the society on 'Potash and a World Emergency.'

The regular meeting of the San Francisco Association of Members of the AMERICAN SOCIETY OF CIVIL ENGINEERS was held at San Francisco on April 17. W. A. Cattell reviewed briefly the work of the International Engineering Congress and William Hood, chief engineer for the Southern Pacific Co., gave some reminiscences of railroading in the West during the past fifty years.

On account of the War, plans for the annual convention of the NATIONAL ELECTRIC LIGHT ASSOCIATION, which was to have been held at Atlantic City, May 28 to June 1 have been abandoned, and instead a special meeting will be held in New York, May 9-10.

Coming Conventions

AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting, Atlantic City, New Jersey, June 26-30.

TRI-STATE GOOD ROADS ASSOCIATION. Annual convention, Medford, Oregon, May 16-17. George E. Boos, secretary, Medford, Oregon.

AMERICAN ASSOCIATION OF ENGINEERS. Annual convention, Chicago, May 14-15.

NATIONAL CONFERENCE ON CITY PLANNING. Annual meeting, Kansas City, Missouri, May 7-9. Flavel Shurtleff, secretary, 19 Congress street, Boston, Massachusetts.

AMERICAN WATER-WORKS ASSOCIATION. Annual meeting, Richmond, Virginia, May 7-11. J. M. Diven, secretary, 47 State street, Troy, New York.

NATIONAL FIRE-PROTECTION ASSOCIATION. Annual meeting, Washington, D. C. F. H. Wentworth, secretary, 87 Milk street, Boston, Massachusetts.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Annual meeting, Cincinnati, May 22-25. Calvin W. Rice, secretary, 29 West 39th street, New York.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Semi-annual meeting, Buffalo, New York, June 20-22. J. C. Olsen, secretary, Copper Union, New York.

AMERICAN IRON AND STEEL INSTITUTE. New York, May 25-26. J. T. McCleary, secretary, 30 Church street, New York.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Annual convention, Hot Springs, Virginia. F. L. Hutchinson, secretary, 2 West 39th street, New York.

NATIONAL ELECTRICAL LIGHT ASSOCIATION. Special meeting to take the place of the annual convention, New York, May 9-10. T. C. Martin, secretary, 29 West 29th street, New York.

Personal

B. G. MCBRIDE, of Elko, has been appointed assistant State engineer of Nevada.

RALPH W. WHITAKER has been appointed city engineer of Bakersfield, California, succeeding R. B. RAY.

F. S. BENSON has been appointed city manager of Bakersfield, California, succeeding WALLACE M. MORGAN.

CHARLES E. HEWES, formerly city manager of Alhambra, California, has been appointed city manager of Alameda.

GEORGE F. MCGONAGLE has been appointed State engineer of Utah, succeeding W. D. BEERS, who has resigned to engage in private practice.

HERBERT NUNN, formerly county engineer of Multnomah county, Oregon, has been appointed chief engineer for the Oregon State Highway Commission.

H. D. SQUIRE, formerly construction engineer for the San Francisco Bridge Co., has been appointed assistant engineer for the State Board of Harbor Commissioners of California.

WILLIAM A. RUSSELL has been appointed by the Bureau of Foreign and Domestic Commerce as a special agent to investigate opportunities for American engineers and manufacturers in Russia.

H. D. H. CONNICK, formerly director of works for the Panama-Pacific Exposition has been appointed vice-president of the International Mercantile Marine Co., with headquarters in New York.

ALBERT DE RUIZ, formerly city engineer of Long Beach, California, has resigned and expects to engage in the shipbuilding business. He has been succeeded by Daniel S. Miller, formerly assistant city engineer.

W. A. POMEROY and W. R. HAMILTON have formed the firm of Pomeroy & Hamilton with offices in the Hobart Bdg., San Francisco. They will engage in general consulting work as mining and petroleum engineers.

J. MORGAN CLEMENTS has been appointed by the Bureau of Foreign and Domestic Commerce of the U. S. Department of Commerce to make a survey of the mineral resources of the Far East, including China and Siberia.

WALTER M. WELLS, formerly valuation engineer of real estate for the California State Railroad Commission, has been appointed land appraiser for the Federal Farm Loan Bank, with headquarters at Berkeley, California.

The following officers were elected by the Pacific Coast section of the National Electric Light Association: president, H. F. JACKSON; vice-presidents, SAMUEL KAHN and E. R. DAVIS; secretary, A. H. HALLORAN; treasurer, A. N. KEMP.

The following Pacific Coast engineers have received commissions in the Officers' Reserve Corps, besides those noted on page 185 of this issue: Majors, GEORGE L. DILLMAN, A. H. BABCOCK, P. E. HARROUN, San Francisco, and W. H. FERGUSON, Hazen, Nevada. Captains, ALBERT D. AKIN, Wickenburg, Arizona; J. W. SWAREN, Hayward, California; PHILIP L. BUSH, San Francisco; WILKIE WOODWARD, BURT HARMON, J. M. MORRIS, Los Angeles; and W. S. POST, San Diego.

Commercial Paragraphs

The name of the YUBA CONSTRUCTION CO., of Marysville and San Francisco, has been changed to the YUBA MANUFACTURING COMPANY.

THE FOUNDATION CO. has published a pamphlet giving photographs and descriptions of some of the more important structures that it has built.

The SPRAY ENGINEERING CO. of Boston, has published Bulletin No. 501 describing the various 'Spraco' products, including cooling, air-washing, and paint-spraying equipment.

The INGERSOLL-RAND CO. has issued two catalogues, one describing the Imperial Type X, duplex steam-driven compressors suitable for general industrial application of compressed air, and the other, the Little David pneumatic drills.

Generated on 2024-09-30 01:27 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Western Engineering

WEEKLY NEWS BULLETIN

WESTERN ENGINEERING *with* WEEKLY NEWS BULLETIN $4.50 per Year

SAN FRANCISCO, MAY 7, 1917

SINGLE COPIES WEEKLY NEWS BULLETIN 15 Cents

Contracts Pending

Bids will be Received		See Issue of News Bulletin
May 7.	Clifton, Ariz., Supplies	May 7
May 7.	Glendale, Cal., Building	May 7
May 7.	Huntington Beach, Cal., Light	May 7
May 7.	Los Angeles, Cal., Sewers	May 7
May 7.	Los Angeles, Cal., Street Work	May 7
May 7.	San Diego, Cal., Street Work	May 7
May 8.	Merced, Cal., Bridge	Apr. 30
May 8.	Mt. Vernon, Wash., Bridge	Apr. 30
May 8.	Mt. Vernon, Wash., Road Work	Apr. 16
May 8.	Port Orchard, Wash., Bridge	Apr. 23
May 8.	Port Orchard, Wash., Road Work	Apr. 23
May 8.	Salem, Ore., Buildings	May 7
May 8.	Shelton, Wash., Road Work	Apr. 23
May 8.	Shelton, Wash., Road Work	Apr. 30
May 8.	Stockton, Cal., Street Work	May 7
May 8.	South Bend, Wash., Road Work	Apr. 30
May 8.	Visalia, Cal., Bridges	Apr. 9
May 8.	Washington, D. C., Machinery and Supplies	Apr. 30
May 8.	Washington, D. C., Supplies	Apr. 23
May 8.	Wenatchee, Wash., Road Work	Apr. 23
May 9.	Auburn, Cal., Street Work	Apr. 30
May 9.	Los Angeles, Cal., Buildings	Apr. 16
May 9.	Oroville, Cal., Supplies	Apr. 23
May 9.	San Francisco, Cal., Street Work	May 7
May 9.	Tacoma, Wash., Bridge	Apr. 30
May 9.	Washington, Cal., Building	Apr. 30
May 10.	Denver, Colo., Machinery	Apr. 16
May 10.	Ephrata, Wash., Building	Apr. 30
May 10.	Lodi, Cal., Building	May 7
May 10.	Los Angeles, Cal., Building	May 7
May 10.	Nogales, Ariz., Bridge	May 7
May 10.	Oakland, Cal., Sewer	May 7
May 10.	Oakland, Cal., Street Work	May 7
May 10.	Port Angeles, Wash., Bridge	Apr. 23
May 10.	Port Angeles, Wash., Road Work	May 7
May 10.	Santa Barbara, Cal., Bridge	May 7
May 10.	Seattle, Wash., Supplies	Apr. 30
May 10.	Washington, D. C., Supplies	May 7
May 10.	Whitehall, Mont., Sewer	May 7
May 10.	Yreka, Cal., Building	May 7
May 11.	Portland, Ore., Bridges	Apr. 30
May 11.	Stockton, Cal., Street Work	May 7
May 12.	Tacoma, Wash., Building	May 7
May 12.	Washington, D. C., Supplies	Apr. 30
May 14.	Bakersfield, Cal., Street Work	Apr. 30
May 14.	Clifton, Ariz., River Work	Apr. 30
May 14.	Huntington, Ore., Sewer	Apr. 30
May 14.	Huntington, Ore., Street Work	Apr. 30
May 14.	Inglewood, Cal., Building	May 7
May 14.	Napa, Cal., Street Work	Apr. 30
May 14.	Olympia, Wash., Bridge	Apr. 30
May 14.	Olympia, Wash., Road Work	Apr. 30
May 14.	Sacramento, Cal., Bridges	Apr. 30
May 14.	Sacramento, Cal., Road Work	Apr. 30
May 14.	Santa Monica, Cal., Supplies	Apr. 30
May 14.	Santa Paula, Cal., Sewer	May 7
May 14.	Seattle, Wash., Supplies	May 7
May 14.	Washington, D. C., Buildings	Apr. 30
May 15.	Eureka, Cal., Bridge	Apr. 30
May 15.	Eureka, Cal., Bridges	Apr. 16
May 15.	Modesto, Cal., Road Work	Apr. 30
May 15.	Red Bluff, Cal., Building	May 7
May 15.	Salt Lake City, Utah, Street Work	Apr. 30
May 15.	Washington, D. C., Supplies	Apr. 30
May 15.	Washington, D. C., Supplies	Apr. 16
May 15.	Washington, D. C., Supplies	May 7
May 17.	Ontario, Ore., Drainage	May 7
May 17.	Pocatello, Ida., Street Work	Apr. 30
May 18.	Los Angeles, Cal., Supplies	May 7
May 21.	Montesano, Wash., Road Work	Apr. 30
May 21.	San Francisco, Cal., Miscellaneous	Apr. 30
May 21.	San Jose, Cal., Bridges	Apr. 23
May 21.	Washington, D. C., Buildings	Apr. 30
May 22.	Sacramento, Cal., Road Work	May 7
May 23.	El Paso, Texas, Irrigation	May 7
May 25.	St. Louis, Mo., Supplies	May 7
May 28.	Clifton, Ariz., Bridge	May 7
May 28.	Ketchikan, Alaska, Supplies	Apr. 23
May 28.	Sacramento, Cal., Road Work	May 7
June 1.	Calcutta, India, Sewer	Jan. 2

Building Permits

In SAN FRANCISCO; $2500 and over in valuation.

APRIL 28

ONE STORY FRAME DWELLING—Cost $2675. Bob Hunt and wife, owners. E Plymouth 26 N San Ramon Way.

APRIL 30

MEZZANINE FLOOR ERECTION—Cost $2500. Star Drug Co., owner. SW Market and 3rd.

(Continued on page 204)

Generated on 2024-09-30 01:23 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Construction News

STREET AND ROAD WORK

ALTURAS, CAL.—Bond issue of $300,000 for construction of county highway system has been proposed. Supervisor J. W. Cummings is interested.

BERKELEY, CAL.—Contract for construction of 9.4 miles of highway in Cleveland National Forest near San Diego has been awarded to C. L. Hyde Construction Co., Spreckels Bdg., San Diego.

EVERETT, WASH.—All bids for construction of permanent highway No. 29 and bond road No. 18 have been rejected because too high.

FLORENCE, ARIZ.—Bond issue of $150,000 for highway construction has been voted.

LOS ANGELES, CAL.—Board of Public Works will receive bids until 10 a.m., May 7, for grading, oiling, and construction of concrete curbs, sidewalks, and gutters on Lillian way and on Raymond avenue.

Contract for improvement of Franklin avenue has been awarded to G. T. McLain, 1184 North Berendo street, Los Angeles, for $832.77.

Contract for improvement of Palos Verdes street has been awarded to Fairchild-Gilmore-Wilton Co., Pacific Electric Bdg., Los Angeles, for $26,134.20.

Contract for improving Carolina street has been awarded to C. H. Johnson, 137 South Normandie avenue, Los Angeles, for $8305.92.

Contract for improvement of Seventh street has been awarded to Fairchild-Gilmore-Wilton Co. for $6355.39.

Contract for improving Baxter street has been awarded to John Sutalo, 476 Bell street, Los Angeles, for $6682.24.

NOGLAES, ARIZ.—Contract for construction of Oro Blanco highway has been awarded to Montana Mines Co. for $17,000. The estimated cost of the highway is $27,000, which indicates that the company's contribution to the cost of the work will be about $10,000.

OAKLAND, CAL.—Bids will be received until noon, May 10, by L. W. Cummings, city clerk, for grading and construction of granite curbs, brick gutters, and asphalt pavement on Second street.

Contract for improvement of 85th and 86th avenues has been awarded to Hutchinson Co., 13th and Franklin streets, Oakland, at the following unit prices: excavation, $0.30 per cu. yd.; redwood curbs, $0.11 per ft.; concrete gutters, $0.14 per sq. ft.; oil-macadam pavement, $0.075 per sq. ft.; concrete sidewalks, $0.10 per sq. ft.; 8-in. sewer, $0.50 per ft.; 21-in. conduit, $2.20 per ft.; 18-in. conduit, $1.25 per ft.; 14-in. conduit, $0.75 per ft.; 10-in. conduit, $0.60 per ft.; manholes, $30 each; stormwater inlets, $30 each; lampholes, $15 each; wye-branches, $0.40 each.

OLYMPIA, WASH.—State Highway Commission has awarded the following contracts:

One mile of Pacific highway near Kalama to Allred & James, Centralia, for $10,728. Other bidders were: Hendricks & Ward, Centralia, $12,643; Lees Dock Co., Rainier, Ore., $13,622; Burcham Bros., Kelso, $10,926.

One mile of Sunset highway near North Bend to Sloan Bros., Box 348, Seattle, for $11,846.

One mile of Inland Empire highway near Colfax to Spokane Asphalt Macadam Paving Co., Spokane, for $18,282. Other bidders were: J. W. Hastings, Spokane, $18,964; General Construction Co., Spokane, $19,196; G. L. Stickler, Pullman, $21,660.

Thirty-three miles of state road No. 23 near Mead to Spokane Bitumass Paving Co., Spokane, $17,484. Spokane Asphalt Macadam Paving Co. bid $25,599.

Eleven miles of Sunset highway near Easton to Gallagher & Mead, Auburn, for $16,494. Other bidders were: F. A. Keasel, Tacoma, $18,522; Sloan Bros., $23,660; Hutter Construction Co., Cle Elum, $25,417.

POMEROY, WASH.—Security Bridge Co., Spokane, was only bidder at $2773 for construction of Clarkston-Pomeroy highway.

Contract for paving several streets has been awarded to Clifton, Applegate & Toole, Spokane, for $35,235.

PORT ANGELES, WASH.—Bids will be received until May 10 by county commissioners for graveling highway at Burnt mountain.

RICHMOND, CAL.—Opening of bids for improvement of Garrard boulevard has been postponed for one week.

SACRAMENTO, CAL.—Bids will be received until May 22 by E. F. Pfund, county clerk, for construction of two divisions of the county highway system, namely, 12 miles of the J Street road and 6 miles of the Marysville road.

Bids will be received until 2 p.m., May 28, by State Highway Commission, Forum Bdg., for the following state highway work: In Yolo county, an undergrade crossing with the Southern Pacific Railroad, including substructure of subway and about 1200 lin. ft. of concrete pavement. In Solano county, between Batavia and Putah creek, 8.4 miles, to be paved with concrete. In Santa Barbara county, between Zaca station and Los Alamos, 9 miles, to be paved with concrete. In Tulare county between Visalia and Tulare, 9 miles, to be paved with concrete. In Ventura county, between the Santa Clara river and Ventura, 4 miles to be paved with concrete. Plans may be seen at office of commission, or at offices of division engineers at San Francisco and Los Angeles.

SAN DIEGO, CAL.—Bids will be received until 10 a.m., May 7, by A. H. Wright, city clerk, for construction of concrete pavement and curbs on 31st street. Estimated cost is $8000.

SAN FRANCISCO, CAL.—Contract for improvement of Beaver street has been awarded to Federal Construction Co., Sharon Bdg., San Francisco, for $15,323.

Board of Public Works will receive bids until 2 p.m., May 9, for construction of concrete curbs and sidewalks and asphalt pavement on 47th avenue and on De Montford avenue.

STOCKTON, CAL.—Contract for improvement of Miner street has been awarded to Clark & Henery Construction Co. for $5144.58.

Contract for improvement of Washington, Sonora, Church, and Sutter streets has been awarded to Federal Construction Co., Sharon Bdg., San Francisco, for $8813.32. Clark & Henery Construction Co. bid $9187.93.

Bids will be received until 10:30 a.m., May 8, by G. W. Pulich, city clerk, for construction of bitulithic pavement on concrete base on American street.

Bids will also be received until May 11 for improvement of Aurora street.

SEWERS AND DRAINAGE

LOS ANGELES, CAL.—Board of Public Works will receive bids until 10 a.m., May 7, for construction of sewers on several streets.

Contract for construction of addition to sewer system at county farm has been awarded to J. P. Hunter, 405 West 58th street, Los Angeles, for $11,400.

OAKLAND, CAL.—Bids will be received until noon, May 10, by L. W. Cummings, city clerk, for construction of 8-in. sewer on Yerba Buena avenue.

ONTARIO, ORE.—Bids will be received until May 17 by secretary Malheur drainage system comprising 3 miles of open drain and 60,000 ft. of wooden box-covered drain.

SAN FRANCISCO, CAL.—Following bids were received for dredging Pierce Street outfall-sewer: Healy-Tibbitts Construction Co., $1830; Tibbitts-Pacific Co., $1890.

SANTA PAULA, CAL.—Bids will be received until May 14 by M. G. Demarest, city clerk, for construction of 1000 ft. of 8-in. vitrified-pipe sewer.

SEDRO-WOOLLEY, WASH.—Contract for construction of lateral sewer has been awarded to M. Gillespie, Sedro-Woolley, for $1957.

WHITEHALL, MONT.—Bids will be received until May 10 by J. W. Reed, city clerk, for construction of sewage-disposal plant. Plans from city engineer upon deposit of $5.

BRIDGES AND CULVERTS

CLIFTON, ARIZ.—Bids will be received until May 28 by A. L. Terry, county clerk, for construction of steel bridge over Gila river.

EL CENTRO, CAL.—Contract for construction of pile-bridges over Alamo river near Calipatria has been awarded to Mercereau Bridge & Construction Co., Pacific Electric Bdg., Los Angeles, for $2297.

EVERETT, WASH.—Contract for construction of trestle across Deadwater slough has been awarded to Everett Construction Co., Everett, for $5887.

Generated on 2024-09-30 01:27 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

NOGALES, ARIZ.—Bids will be received until 3 p.m., May 10, at office of collector of customs, for construction of bridge on customs reservation.

SANTA BARBARA, CAL.—Bids will be received until noon, May 10, by A. C. Hall, city clerk, for construction of reinforced concrete bridge on Hollister avenue across Mission creek.

SETTTLE, WASH.—J. A. McEachern Co., Bell Street dock, was low bidder at $61,606 for construction of West Spokane Street bridge.

Contract for construction of 1700-ft. pile-trestle across north end of Lake Washington has been awarded to C. Geske & Co., Pacific Bdg., Seattle, for $12,354.

SPOKANE, WASH.—City engineer Morton Macartney has completed plans for steel bridge at Post street. One design calls for an expenditure of $260,000 and the other for $300,000.

IRRIGATION AND WATER SUPPLY

EL PASO, TEXAS.—Bids will be received until 2 p.m., May 23, at office of U. S. Reclamation Service for construction of canals on the Rio Grande project near Garfield, New Mexico, requiring 196,000 cu. yd. excavation. Plans are on file at office of 'Western Engineering.'

PARADISE, CAL.—Citizens National Bank of Los Angeles made the highest bid and will probably be awarded the bond issue of $350,000 voted by the Paradise irrigation district. The bid was 98.25. Bids for construction of the irrigation system were received from Tibbitts-Pacific Co., W. C. Duncan Co., W. E. Kraner Co., all of San Francisco; Contra Costa Construction Co., Berkeley; and R. F. Ware, Los Angeles. California Corrugated Culvert Co. and Western Pipe & Steel Co. bid on furnishing pipe, and D. W. Alberts bid on the construction of the dam.

SAN DIEGO, CAL.—Contract for construction of dams and conduit at Del Mar and San Dieguito has been awarded to Bent Bros., 825 Central Bdg., Los Angeles, at about $170,000 for the dams and $91,696 for the conduit, including five miles of 4-ft. concrete flume and 1450 ft. of galvanized metal flume. Duncanson & Harrelson bid about $210,000 for the dams, and Sharp & Fellows Construction Co. about the same.

SAN FRANCISCO, CAL.—State Water Commission has received the following applications for permission to divert water:

Annie Lawrence, Palo Verde, 4 second-feet from tributary of Colorado river for irrigation. Plans include pumping-plant. Estimated cost is $3000.

D. F. Foley, Pattiway, ⅛ second-foot from tributary to Cuyama river for stock-watering. Plans include two miles of pipe.

Charles W. Landis, San Francisco, 3000 second-feet from Mokelumne river for irrigation. Plans include reinforced concrete multiple-arch diversion dam and canals. Estimated cost is $600,000.

Western States Gas & Electric Co., Stockton, 20,600 acre-feet from lakes in El Dorado and Alpine counties, for power-purposes. Plans include main ditch 7 miles long, three small dams, and a diversion tunnel, 5½ by 6 ft. by 2600 ft. long.

LIGHT, HEAT, AND POWER

FRESNO, CAL.—San Joaquin Light & Power Co. will spend $2,362,942 on construction and improvement of stations, and construction of new transmission-lines.

HUNTINGTON BEACH, CAL.—Bids will be received until May 7 by Charles R. Nutt, city clerk, for construction of ornamental lighting system on Main street.

PORTLAND, ORE.—J. L. Stannard, consulting engineer employed to report on the project, estimated that the proposed municipal power-plant will cost $3,391,000.

RIVER AND HARBOR WORK

EL CENTRO, CAL.—C. E. Grunsky and George G. Anderson, consulting engineers, have recommended that the Imperial irrigation district strengthen the levees along the Colorado river immediately.

SAN FRANCISCO, CAL.—Following bids were received by State Harbor Commission for construction of an apron-wharf 80 by 1600 ft. long on Islais creek: Healy-Tibbitts Construction Co., $60,680; Clinton Construction Co., $63,400; Duncanson-Harrelson Co., $67,493; San Francisco Bridge Co., $67,694; Tibbitts-Pacific Co., $68,990; J. D. Hannah, $70,000; C. E. Lamburgh, $72,000; Hyde, Harjes & Co., $76,613. Contract was awarded to Healy-Tibbitts Construction Co., Main and Market streets, San Francisco.

Following bids were received by State Board of Harbor Commissioners for construction of pier No. 46, including repair of burned wharf, about 130,000 sq. ft. of reconstruction, and the construction of a new shed with an area of 125,000 sq. ft. Proposition No. 1 is for pure iron roofing, No. 2 is for copper-bearing iron roofing, No. 3 is for a three-ply asbestos roof and gutters, No. 4 is for a four-ply roof. J. D. Hannah, No. 3, $187,000; No. 4, $190,000; Healy-Tibbitts Construction Co., No. 3, $181,500; No. 4, $185,558; Clinton Construction Co., No. 1, $180,390; No. 3, $182,116; No. 4, $185,311; San Francisco Bridge Co., No. 1, $188,703; No. 3, $195,094; No. 4, $195,-285; Tibbitts-Pacific Co., No. 1, $187,703; No. 2, $187,097; No. 3, $187,197; No. 4, $190,397; Monson Bros., No. 3, $207,000; No. 4, $210,918; Masow & Morrison, No. 3, $185,896; No. 4, $189,421. All bids were rejected and work will probably be re-advertised.

RAILROAD WORK

GREAT FALLS, MONT.—Contract for construction of terminal for Great Northern Railway Co. at Bowdoin has been awarded to Grant, Smith & Co., Seattle, for $300,000. Contract for grading yards for terminal at Wolf Point has been awarded to A. Guthrie & Co., Portland.

LOS ANGELES, CAL.—Amargosa Valley Railroad Co. has been incorporated to construct 16 miles of railroad in Nevada. Avawatz Salt & Gypsum Co., Garland Bdg., Los Angeles, is interested.

MESA, ARIZ.—Contract for grading part of Clarkdale & Mesa Railroad has been awarded to Shattuck & Nimmo, 9th and Alameda streets, Los Angeles.

SLOAN, NEV.—Benedict & Moorman, Huntington Beach, Cal., have been awarded contract for grading spur-track for Salt Lake Route.

BUILDING CONSTRUCTION

ALAMEDA, CAL.—Alameda Savings Bank will construct $30,000 building. Edward T. Foulkes, Crocker Bdg., San Francisco, is architect.

ANDERSON, CAL.—Election has been called for May 26 to vote on bond issue of $40,000 for construction of school building.

BAKERSFIELD, CAL.—First Congregational Church will construct brick and hollow-tile building. George E. Wilson, Bakersfield, is architect.

BERKELEY, CAL.—J. W. Plachek, Acheson Bdg., Berkeley, is preparing plans for three-story reinforced concrete building to be constructed at University and Shattuck avenues. Estimated cost is $40,000.

CLOVERDALE, CAL.—E. E. Etherton & Co., Monadnock Bdg., San Francisco, was low bidder at $23,700 for construction of reinforced concrete school building. J. C. Hurley Co., 509 Sixth street, San Francisco, was low bidder at $2892 for heating and ventilating.

COLUMBIA FALLS, IDA.—Contract for construction of addition to Soldiers' Home has been awarded to Caesar Haverlandt, Columbia Falls, for $16,875.

GLENDALE, CAL.—Bids will be received until May 7 by J. W. Usilton, chairman of building committee, for construction of building for Order of Elks. Estimated cost is $45,000.

INGLEWOOD, CAL.—Library board will receive bids until May 14 for construction of library-building. C. H. Russell, Story Bdg., is architect. Estimated cost is $10,000.

LODI, CAL.—Bids will be received until May 10 by Lodi Investment Co. for construction of theatre-building. Stone & Wright, San Joaquin Valley Bank Bdg., Stockton, are architects.

LOS ANGELES, CAL.—Board of education, 730 Security Bdg., will receive bids until 9 a.m., May 10, for construction of cafeteria-building at Los Angeles high school.

Contract for construction of three-story brick hotel building for Harbolt Hotel Corporation has been awarded to Hetzel-Winget Co., California Bdg., Los Angeles.

NEVADA CITY, CAL.—Contract for construction of reinforced concrete store-building for Alpha Hardware Co. has been awarded to E. T. Leiter & Sons, Call Bdg., San Francisco.

OAKLAND, CAL.—Board of Supervisors has set August 14 as a tentative date for an election to vote on bond issue of $2,000,000; $500,000 being for county's share of cost of bascule-bridge over estuary, $1,000,000 for a new county hospital, and $500,000 for improving present county infirmary.

Generated on 2024-09-30 01:24 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

M. L. Newsom, 1748 Broadway, Oakland, is preparing plans for brick apartment-house to be constructed for A. Werum. Estimated cost is $26,000.

OGDEN, UTAH.—Bond issue of $200,000 for construction of school-buildings has been voted.

PLACERVILLE, CAL.—J. S. Hannah, Williams Bdg., San Francisco, was low bidder for construction of school-buildings at $27,740 for the large building, $4736 for the small one, or $31,380 for the two. Other bidders were: Caldwell & Son, $27,850 and $5167; E. E. Etherton & Co., $31,000 and $5000; C. Cote, $31,100 and $4700; J. L. Philbrick, $29,500 and $5320; C. McDougall, $6250.

PORTLAND, ORE.—Contract for construction of five concrete grain-elevators and one wooden elevator has been awarded to Burrell Engineering & Construction Co., Lewis Bdg., Portland.

RED BLUFF, CAL.—Bids will be received until 2 p.m., May 15, by E. E. Stevens, school clerk, for construction of addition to grammar-school building.

SACRAMENTO, CAL.—All bids for construction of school building were rejected because they exceeded the $190,000 available for the work. New call for bids will be issued, probably on revised plans.

SALEM, ORE.—Bids will be received until May 8 by state board of control for construction of two state buildings.

ST. JOHNS, ARIZ.—Contract for construction of court-house has been awarded to N. P. Olson Construction Co., Holbrook, for $36,367.

SALT LAKE CITY, UTAH.—Deseret National Bank will construct 14-story class A building. Estimated cost is $850,000.

SAN FRANCISCO, CAL.—Contract for construction of two school-buildings has been awarded to J. S. Hannah, Williams Bdg., San Francisco, for $32,575.

Ward & Blohme, Alaska Commercial Bdg., San Francisco, are preparing plans for brick fire-house at Vermont and 25th streets. Estimated cost is $35,000.

F. H. Meyer, Bankers Investment Bdg., San Francisco, has completed plans for brick apartment-house at Post and Polk streets. He is also preparing plans for six-story office building to be constructed at Sutter and Mason streets.

Contract for construction of brick building at Mission and 30th streets has been awarded to P. A. McLean, 761 17th avenue, San Francisco, for $12,000.

W. H. Crim, Jr., 425 Kearny street, San Francisco, is preparing plans for buildings for California-Hawaiian Sugar Co. at Crockett. Estimated cost is $3,000,000. Bids for the first unit will be opened soon.

Rousseau & Rousseau, 110 Sutter street, have completed plans for reinforced concrete garage to be erected on Spencer street near 15th. Estimated cost is $25,000.

SAN JOSE, CAL.—Philip Bush, 120 Market street, San Francisco, is preparing plans for one-story reinforced concrete packing-house for California Packing Corporation.

SPARKS, NEV.—Caldwell & Son, San Fancisco, were low bidders at about $46,000 for construction of school-building.

STOCKTON, CAL.—Bids are being received by Sala & Mayo, Commercial & Savings Bank Bdg., Stockton, for construction of three-story brick apartment-house.

TACOMA, WASH.—Bids will be received until May 12 by county commissioners for construction of children's ward at Mountain View sanitarium.

WASHINGTON, D. C.—Latimer & Benning, Kansas City, Mo., were low bidders at $88,743 for construction of post-office at Las Cruces, New Mexico.

YREKA, CAL.—City clerk will receive bids until May 10 for construction of reinforced concrete building for city hall. Estimated cost is $10,000.

MACHINERY AND SUPPLIES

CLIFTON, ARIZ.—Bids will be received until May 7 by A. L. Terry, county clerk, for furnishing 1000 ft. of corrugated metal pipe, diameters ranging from 12 to 48 inches.

HANFORD, CAL.—Contract for furnishing fire-hydrants to city has been awarded to Hanford Manufacturing Co. at $40 each for 4-in. and $42 for 6-in. hydrants.

Waterworks Supply Co., Union Oil Bdg., Los Angeles, was only bidder for furnishing gate-valves to city at $11.50 each for 4-in. and $20 each for 6-in. valves.

LOS ANGELES, CAL.—Bids will be received until May 18 by department of public service for furnishing water-meters.

ST. LOUIS, MO.—Bids will be received until May 25 by Commissioner of Indian Affairs, 310 Elm street, for furnishing hardware and electrical supplies for Indian Service. Particulars from U. S. Indian Warehouse, 608 Howard street, San Francisco.

SAN FRANCISCO, CAL.—Bureau of Foreign and Domestic Commerce, 306 Custom House, has information regarding firm in Australia that is in the market for 20,000 ft. of 6-in. well-casing.

Bureau also has information regarding firm in Australia that is in the market for metal pipe. Refer to No. 24304.

Bureau also has information regarding firm in Argentina that is in the market for agricultural machinery.

SEATTLE, WASH.—Bids will be received until May 14 by C. E. Dole, purchasing agent, Alaskan Engineering Commission, for furnishing a steam-hammer and parts, machine-shop equipment, hardware, small tools, sheet-steel and bar-iron. Particulars from circular No. 281, which may be obtained from the office of the commission, 514 Kohl Bdg., San Francisco.

WASHINGTON, D. C.—Bids will be received until May 10 at office of general purchasing officer, the Panama Canal, for furnishing washers, screws, and small tools. Particulars from circular No. 2124, which may be obtained from assistant purchasing agent, Fort Mason, San Francisco.

Bureau of Supplies and Accounts, Navy Department, will receive bids until May 15 for the following: for delivery at Mare Island, Cal.: 20,625 sq. ft. tarred-felt sheathing, 1300 ft. rubber suction-hose, schedule 978; miscellaneous quantity steel and iron bolts, butt-hinges, and hardware, 1500 ft. galvanized-steel coil-chain, 1200 cut copper boat-nails, schedule 980; for delivery at Puget Sound, Wash.: 5000 ft. rubber fire-hose, schedule 978; miscellaneous quantity phosphor-bronze wire and crucible-steel wire, 576 adjustable S-wrenches, schedule 980; 5 stockless anchors, schedule 1034; 1 bolt-threading machine, two 20 or 30-in. hand-screws, schedule 1035; for delivery at Mare Island and Puget Sound, 1600 lb. packing for condenser-tubes, schedule 975; for delivery at Pearl Harbor, Hawaii, one 5-in. by 12-ft. engine-lathe, schedule 1036.

Contract for furnishing four drag-line excavators to U. S. Reclamation Service has been awarded to Bucyrus Company.

BUILDING PERMITS

(Continued from page 201)

ONE AND TWO STORY BRICK STORES AND LOFTS—Cost $8000. L. and J. De Martini, owners. Grant Ave and Union St.

TWO STORY FRAME FLATS—Cost $3850. John J. Binet Co., owner. W Linda 126 S 18th.

THREE STORY FRAME TENEMENTS—Cost $10,000. E. A. Janssen, owner. NE 15th Ave and Geary.

OFFICE ALTERATIONS—Cost $25,000. Boston Investment Co., owner. 942 Market.

WAREHOUSE ALTERATIONS—Cost $3000. N. Y. Lubricating Co., owner. N 20th, Minnesota and Indiana.

MAY 2

ONE STORY BRICK SHOP—Cost $6500. C. O. Holman and H. Durbrow, owners. E Valencia 150 N 15th.

TWO STORY FRAME FACTORY—Cost $2800. Reed Pickle Works, owner. 1507 Folsom.

MAY 3

THREE STORY FRAME TENEMENTS—Cost $22,000. Julie H. Bernal, owner. S 17th 30 E Church.

ONE STORY FRAME DWELLING—Cost $2950. Geo. A. Merkey, owner. NW Elmwood and Faxon.

THREE STORY FRAME FLATS AND CARPET-BEATING WORKS—Cost $6900. J. E. Emmons, owner. NW Baker and Geary.

ONE STORY FRAME DWELLING—Cost $2500. Thomas Hamill, owner. N Balboa 1076 E 18th Ave.

THREE STORY FRAME STORE AND FLATS—Cost $6000. Paginini Bros., owners. SE Lombard and Stockton.

TWO STORY BRICK AUTO SALES ROOM AND REPAIR SHOP—Cost $27,000. Ignetz Steinhart, owner. W Van Ness Ave 60 S California.

THREE STORY FRAME APARTMENTS—Cost $25,000. B. W. Hartman, owner. NE Octavia and O'Farrell.

Generated on 2024-09-30 01:25 GMT / https://hdl.handle.net/2027/uiug.30112007838433
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN